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<10> JOBLING, STEPHEN A.
SAFFORD, RICHARD

<120> IMPROVEMENTS IN OR RELATING TO STARCH CONTENT OF PLANTS

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<140> 09/297,703

<141> 1999-07-19

<150> 9623095.8

<151> 1996-11-05

<150> PCT/GB97/03032

<151> 1997-11-04

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<170> PatentIn version 3.2

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Pro Cys Ala Pro Leu Cys Lys Ser Gln Ser Thr Gly Phe His Gly Tyr
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Arg Arg Thr Ser Ser Cys Leu Ser Phe Asn Phe Lys Glu Ala Phe Ser
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agg agg gtc ttc tct gga aag tca tct cat gaa tct gac tcc tca aat 197
Arg Arg Val Phe Ser Gly Lys Ser Ser His Glu Ser Asp Ser Ser Asn
45 50 55

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Val Met Val Thr Ala Ser Lys Arg Val Leu Pro Asp Gly Arg Ile Glu
60 65 70 75

tgc tat tct tct tca aca gat caa ttg gaa gcc cct ggc aca gtt tca 293
Cys Tyr Ser Ser Ser Thr Asp Gln Leu Glu Ala Pro Gly Thr Val Ser
80 85 90

gaa gaa tcc cag gtg ctt act gat gtt gag agt ctc att atg gat gat 341
Glu Glu Ser Gln Val Leu Thr Asp Val Glu Ser Leu Ile Met Asp Asp
95 100 105

aag att gtt gaa gat gaa gta aat aaa gaa tct gtt cca atg cgg gag 389
Lys Ile Val Glu Asp Glu Val Asn Lys Glu Ser Val Pro Met Arg Glu
110 115 120

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Thr Val Ser Ile Arg Lys Ile Gly Ser Lys Pro Arg Ser Ile Pro Pro
125 130 135

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Pro Gly Arg Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser Leu Thr Gly	
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Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg	
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Glu Glu Ile Asp Lys Tyr Glu Gly Ser Leu Asp Ala Phe Ser Arg Gly	
175 180 185	
tat gaa aag ttt ggt ttc tca cgc agt gaa aca gga ata act tat aga	629
Tyr Glu Lys Phe Gly Phe Ser Arg Ser Glu Thr Gly Ile Thr Tyr Arg	
190 195 200	
gag tgg gca cca gga gct acg tgg gct gca ttg att gga gat ttc aat	677
Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn	
205 210 215	
aac tgg aat cct aat gca gat gtc atg act cag aat gag tgt ggt gtc	725
Asn Trp Asn Pro Asn Ala Asp Val Met Thr Gln Asn Glu Cys Gly Val	
220 225 230 235	
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Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro	
240 245 250	
cat ggt tct cga gta aag ata cgc atg gat act cca tct ggc aac aaa	821
His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Asn Lys	
255 260 265	
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Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu	
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Leu Pro Tyr Asn Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys Tyr	
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Val Phe Lys Asn Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr	
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Glu Ser His Val Gly Met Ser Ser Thr Glu Pro Val Ile Asn Thr Tyr	
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Asn Ala Val Gln Leu Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser	
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act cct gat gat tta aag tct cta ata gat aaa gct cac gag tta ggt Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu Gly 380 385 390 395	1205
ctt ctt gtt ctc atg gat att gtt cat agc cat gca tca act aat acg Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Thr Asn Thr 400 405 410	1253
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acc att ggt gaa gat gtt agt gga atg cca aca gtt tgc att ccg gtt Thr Ile Gly Glu Asp Val Ser Gly Met Pro Thr Val Cys Ile Pro Val 525 530 535	1637
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gat aaa tgg gtt gag att att cag aag aga gat gaa gat tgg aaa atg Asp Lys Trp Val Glu Ile Ile Gln Lys Arg Asp Glu Asp Trp Lys Met 560 565 570	1733
ggg gac att gta cat atg ctg acc aac agg cgg tgg ttg gaa aag tgt Gly Asp Ile Val His Met Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys 575 580 585	1781

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590 595 600	
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Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Leu	
605 610 615	
gac aga cca tct act cct ctc ata gat cgt gga gta gca ttg cac aaa	1925
Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Val Ala Leu His Lys	
620 625 630 635	
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Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn	
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Gly Asp Leu His Leu Pro Ser Gly Lys Phe Val Pro Gly Asn Asn Tyr	
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Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asn Ser Lys His	
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720 725 730	
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750 755 760	
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Gly Cys Leu Lys Pro Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp	
765 770 775	
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Pro Leu Phe Gly Gly Phe Gly Arg Leu Ser His Asp Ala Glu His Phe	
780 785 790 795	
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Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg Glu Glu Ile Asp Lys			
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Tyr Glu Gly Ser Leu Asp Ala Phe Ser Arg Gly Tyr Glu Lys Phe Gly			
180	185	190	

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Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn Asn Trp Asn Pro Asn
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Ala Asp Val Met Thr Gln Asn Glu Cys Gly Val Trp Glu Ile Phe Leu
225 230 235 240
Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro His Gly Ser Arg Val
245 250 255
Lys Ile Arg Met Asp Thr Pro Ser Gly Asn Lys Asp Ser Ile Pro Ala
260 265 270
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275 280 285
Ile Tyr Tyr Asp Pro Pro Glu Glu Lys Tyr Val Phe Lys Asn Pro
290 295 300
Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr Glu Ser His Val Gly
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Met Ser Ser Thr Glu Pro Val Ile Asn Thr Tyr Ala Asn Phe Arg Asp
325 330 335
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Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly Tyr His Val
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His His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly Ser Trp Glu
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Val Leu Arg Phe Leu Leu Ser Asn Ala Arg Trp Trp Leu Asp Glu Tyr
450 455 460
Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met Met Tyr Thr
465 470 475 480
His His Gly Leu Gln Val Asp Phe Thr Gly Asn Tyr Asn Glu Tyr Phe

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Arg	Ile	Ile	Val	Phe	Glu	Arg	Gly	Asn	Leu	Val	Phe	Val	Phe	Asn	Phe																
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His	Trp	Thr	Ser	Ser	Tyr	Ser	Asp	Tyr	Arg	Val	Gly	Cys	Leu	Lys	Pro																
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Gly	Lys	Tyr	Lys	Ile	Val	Leu	Asp	Ser	Asp	Asp	Pro	Leu	Phe	Gly	Gly																
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Phe Gly Arg Leu Ser His Asp Ala Glu His Phe Ser Phe Glu Gly Trp
785 790 795 800

Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Thr Pro Cys Arg Thr
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Ala Pro Ser Leu Tyr Lys Ser Gln Leu Thr Ser Phe His Gly Gly Arg
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Arg Thr Ser Ser Gly Leu Ser Phe Leu Leu Lys Lys Glu Leu Phe Pro
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Leu Thr Val Ser Ala Ser Glu Lys Val Leu Val Pro Asp Asp Gln Ile
65 70 75
gat ggc tct tct tct tca aca tat caa tta gaa acc act ggc aca gtt 409
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Leu His Glu Thr Ile Ser Ile Gly Lys Ser Glu Ser Lys Pro Arg Ser			
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Leu Ala Gly Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys			
	160	165	170
agg ctg cgt gag gaa att gac aag tat gaa ggt ggt ttg gat gca ttc			697
Arg Leu Arg Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Asp Ala Phe			
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Ser Arg Gly Phe Glu Lys Phe Gly Phe Leu Arg Ser Glu Thr Gly Ile			
	190	195	200
act tat agg gaa tgg gca cct gga gct acg tgg gct gca ctt att gga			793
Thr Tyr Arg Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly			
	210	215	220
gat ttc aac aat tgg aat cct aat gca gat gtc atg act cgg aat gag			841
Asp Phe Asn Asn Trp Asn Pro Asn Ala Asp Val Met Thr Arg Asn Glu			
	225	230	235
ttt ggt gtc tgg gag att ttt ttg cca aat aac gca gat ggt tca cca			889
Phe Gly Val Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro			
	240	245	250
cca att cct cat ggt tct cga gta aag ata cgc atg gat act cca tct			937
Pro Ile Pro His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser			
	255	260	265
ggc atc aaa gat tca att cct gct tgg atc aag ttc tca gtt cag gca			985
Gly Ile Lys Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala			
	270	275	280
cct ggt gaa atc cca tac aat gcc ata tac tat gat cca cca aag gag			1033
Pro Gly Glu Ile Pro Tyr Asn Ala Ile Tyr Tyr Asp Pro Pro Lys Glu			
	290	295	300
gag aag tat gtg ttc aaa cat cct cag cca aag aga cca aaa tca ctt			1081
Glu Lys Tyr Val Phe Lys His Pro Gln Pro Lys Arg Pro Lys Ser Leu			
	305	310	315
agg att tat gaa tct cat gtt ggg atg agt agt atg gag cca ata att			1129

Arg	Ile	Tyr	Glu	Ser	His	Val	Gly	Met	Ser	Ser	Met	Glu	Pro	Ile	Ile		
	320						325					330					
aac	aca	tat	gcc	aac	ttt	aga	gat	gat	atg	ctt	cct	cgc	atc	aaa	aag	1177	
Asn	Thr	Tyr	Ala	Asn	Phe	Arg	Asp	Asp	Met	Leu	Pro	Arg	Ile	Lys	Lys		
	335					340					345						
ctt	ggc	tac	aat	gct	gtt	cag	atc	atg	gct	att	caa	gag	cat	tcc	tat	1225	
Leu	Gly	Tyr	Asn	Ala	Val	Gln	Ile	Met	Ala	Ile	Gln	Glu	His	Ser	Tyr		
	350				355					360					365		
tat	gct	agt	ttt	ggg	tac	cat	gtc	aca	aac	ttt	ttt	gca	cct	agc	agc	1273	
Tyr	Ala	Ser	Phe	Gly	Tyr	His	Val	Thr	Asn	Phe	Phe	Ala	Pro	Ser	Ser		
				370					375					380			
cga	ttt	gga	act	cct	gat	gat	ttg	aag	tct	tta	ata	gat	aaa	gct	cat	1321	
Arg	Phe	Gly	Thr	Pro	Asp	Asp	Leu	Lys	Ser	Leu	Ile	Asp	Lys	Ala	His		
			385					390					395				
gag	tta	ggg	ctg	ctt	gtt	ctc	atg	gat	att	gtt	cat	agc	cat	gcg	tca	1369	
Glu	Leu	Gly	Leu	Leu	Val	Leu	Met	Asp	Ile	Val	His	Ser	His	Ala	Ser		
	400						405					410					
aat	aat	acg	ttg	gat	ggg	ctg	aac	atg	ttt	gat	ggg	acg	gat	agt	cac	1417	
Asn	Asn	Thr	Leu	Asp	Gly	Leu	Asn	Met	Phe	Asp	Gly	Thr	Asp	Ser	His		
	415					420					425						
tac	ttc	cac	tcc	gga	tca	cgg	ggg	cat	cat	tgg	ttg	tgg	gac	tct	cgc	1465	
Tyr	Phe	His	Ser	Gly	Ser	Arg	Gly	His	His	Trp	Leu	Trp	Asp	Ser	Arg		
	430				435					440					445		
ctt	ttc	aac	tat	gga	agc	tgg	gag	gtg	cta	aga	ttt	ctt	ctt	tca	aat	1513	
Leu	Phe	Asn	Tyr	Gly	Ser	Trp	Glu	Val	Leu	Arg	Phe	Leu	Leu	Ser	Asn		
				450				455						460			
gca	aga	tgg	tgg	ttg	gaa	gag	tac	agg	ttt	gat	ggg	ttt	aga	ttt	gat	1561	
Ala	Arg	Trp	Trp	Leu	Glu	Glu	Tyr	Arg	Phe	Asp	Gly	Phe	Arg	Phe	Asp		
			465					470					475				
ggg	gtg	act	tcc	atg	atg	tac	act	ccc	cat	ggg	ttg	cag	gta	gct	ttt	1609	
Gly	Val	Thr	Ser	Met	Met	Tyr	Thr	Pro	His	Gly	Leu	Gln	Val	Ala	Phe		
		480					485					490					
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Thr	Gly	Asn	Tyr	Asn	Glu	Tyr	Phe	Gly	Tyr	Ala	Thr	Asp	Val	Asp	Ala		
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Val	Ile	Tyr	Leu	Met	Leu	Val	Asn	Asp	Met	Ile	His	Gly	Leu	Phe	Pro		
	510				515					520					525		
gag	gct	gtt	acc	att	ggg	gaa	gat	gtt	agc	gga	aag	cca	aca	ttt	tgc	1753	
Glu	Ala	Val	Thr	Ile	Gly	Glu	Asp	Val	Ser	Gly	Lys	Pro	Thr	Phe	Cys		
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gcc att gcc gat aaa tgg att gag att ctt aag aag aga gat gag gac Ala Ile Ala Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp 560 565 570	1849
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gaa aaa tgt gtt gct tat gct gaa agt cat gac caa gct ctt gtt ggt Glu Lys Cys Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly 590 595 600 605	1945
gac aaa act att gca ttt tgg ctg atg gac aag gac atg tac gac ttc Asp Lys Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe 610 615 620	1993
atg gct cgt gac aga cca tct act cct ctt ata gat cgt gga ata gca Met Ala Arg Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala 625 630 635	2041
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tat ttg aat ttt atg gga aat gaa ttt gga cat cct gag tgg att gat Tyr Leu Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp 655 660 665	2137
ttt cca aga ggg gat cga cat ctg ccc aat ggt aaa gta att cca ggg Phe Pro Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly 670 675 680 685	2185
aac aac cac agt tat gat aaa tgc cgt cgt aga ttt gat cta ggt gat Asn Asn His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp 690 695 700	2233
gca gac tat cta aga tat cat gga atg caa gag ttt gat cag gca atg Ala Asp Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met 705 710 715	2281
caa cat ctt gaa gaa gcc tat ggt ttc atg act tct gag cac cag tat Gln His Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr 720 725 730	2329
ata tca cgg aag gat gaa gga gat cgg atc att gtc ttt gag agg gga Ile Ser Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly 735 740 745	2377
aac ctt gtt ttt gta ttc aac ttt cat tgg act aac agc tat tca gat Asn Leu Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp 750 755 760 765	2425

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Tyr Arg Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp	
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tcg gat gat ggc ttg ttt gga ggc ttc aac agg ctt agt cat gat gcc	2521
Ser Asp Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala	
785 790 795	
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Glu His Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe	
800 805 810	
atg gta tat gca cca tct agg aca gca gtg gtc tat gct tta gta gaa	2617
Met Val Tyr Ala Pro Ser Arg Thr Ala Val Val Tyr Ala Leu Val Glu	
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gat gaa gag aat gaa gca gag aat gaa gta gaa agt gaa gtg aaa cca	2665
Asp Glu Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro	
830 835 840 845	
gcc tcc ggc tga gatagatatt tagtaagagg atcccctaaa gcaggaatgg	2717
Ala Ser Gly	
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<220>
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 Phe Ala Gly Lys Ser Ser Tyr Glu Ser Asp Ser Ser Asn Leu Thr Val
 50 55 60
 Ser Ala Ser Glu Lys Val Leu Val Pro Asp Asp Gln Ile Asp Gly Ser
 65 70 75 80
 Ser Ser Ser Thr Tyr Gln Leu Glu Thr Thr Gly Thr Val Leu Glu Glu
 85 90 95
 Ser Gln Val Leu Gly Asp Ala Glu Ser Leu Val Met Glu Asp Asp Lys

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Thr	Ile	Ser	Ile	Gly	Lys	Ser	Glu	Ser	Lys	Pro	Arg	Ser	Ile	Pro	Pro
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Pro	Gly	Ser	Gly	Gln	Arg	Ile	Tyr	Asp	Ile	Asp	Pro	Ser	Leu	Ala	Gly
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Phe	Arg	Gln	His	Leu	Asp	Tyr	Arg	Tyr	Ser	Gln	Tyr	Lys	Arg	Leu	Arg
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Glu	Glu	Ile	Asp	Lys	Tyr	Glu	Gly	Gly	Leu	Asp	Ala	Phe	Ser	Arg	Gly
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Phe	Glu	Lys	Phe	Gly	Phe	Leu	Arg	Ser	Glu	Thr	Gly	Ile	Thr	Tyr	Arg
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Asn	Trp	Asn	Pro	Asn	Ala	Asp	Val	Met	Thr	Arg	Asn	Glu	Phe	Gly	Val
225					230					235					240
Trp	Glu	Ile	Phe	Leu	Pro	Asn	Asn	Ala	Asp	Gly	Ser	Pro	Pro	Ile	Pro
				245					250					255	
His	Gly	Ser	Arg	Val	Lys	Ile	Arg	Met	Asp	Thr	Pro	Ser	Gly	Ile	Lys
			260					265					270		
Asp	Ser	Ile	Pro	Ala	Trp	Ile	Lys	Phe	Ser	Val	Gln	Ala	Pro	Gly	Glu
		275					280					285			
Ile	Pro	Tyr	Asn	Ala	Ile	Tyr	Tyr	Asp	Pro	Pro	Lys	Glu	Glu	Lys	Tyr
	290					295					300				
Val	Phe	Lys	His	Pro	Gln	Pro	Lys	Arg	Pro	Lys	Ser	Leu	Arg	Ile	Tyr
305					310					315					320
Glu	Ser	His	Val	Gly	Met	Ser	Ser	Met	Glu	Pro	Ile	Ile	Asn	Thr	Tyr
				325					330					335	
Ala	Asn	Phe	Arg	Asp	Asp	Met	Leu	Pro	Arg	Ile	Lys	Lys	Leu	Gly	Tyr
			340					345					350		
Asn	Ala	Val	Gln	Ile	Met	Ala	Ile	Gln	Glu	His	Ser	Tyr	Tyr	Ala	Ser
		355					360					365			
Phe	Gly	Tyr	His	Val	Thr	Asn	Phe	Phe	Ala	Pro	Ser	Ser	Arg	Phe	Gly
	370					375					380				
Thr	Pro	Asp	Asp	Leu	Lys	Ser	Leu	Ile	Asp	Lys	Ala	His	Glu	Leu	Gly
385					390					395					400

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 405 410 415
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 420 425 430
 Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe Asn
 435 440 445
 Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg Trp
 450 455 460
 Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val Thr
 465 470 475 480
 Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe Thr Gly Asn
 485 490 495
 Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Ile Tyr
 500 505 510
 Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala Val
 515 520 525
 Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys Ile Pro Val
 530 535 540
 Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile Ala
 545 550 555 560
 Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp Trp Lys Met
 565 570 575
 Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys
 580 585 590
 Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr
 595 600 605
 Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Arg
 610 615 620
 Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His Lys
 625 630 635 640
 Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn
 645 650 655
 Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg
 660 665 670
 Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn His
 675 680 685
 Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp Tyr
 690 695 700

Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His Leu
 705 710 715 720
 Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg
 725 730 735
 Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val
 740 745 750
 Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg Val
 755 760 765
 Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp
 770 775 780
 Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His Phe
 785 790 795 800
 Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr
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<220>
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<210> 37
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<220>
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<400> 37
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 agcgaa atg gga cac tac acc ata tca gga ata cgt ttt cct tgt gct 168
 Met Gly His Tyr Thr Ile Ser Gly Ile Arg Phe Pro Cys Ala
 1 5 10
 cca ctc cgc aaa tct caa tct acc ggc ttc cat ggt gat cga agg acc 216
 Pro Leu Arg Lys Ser Gln Ser Thr Gly Phe His Gly Asp Arg Arg Thr
 15 20 25 30
 tcc tct tgc ctt tcc ttc aac ttc aag aag gcg gcg ttt tct agg agg 264
 Ser Ser Cys Leu Ser Phe Asn Phe Lys Lys Ala Ala Phe Ser Arg Arg
 35 40 45
 gtc ttc tct gga aag tca tct cat gaa tct gac tcc tca aat gta atg 312
 Val Phe Ser Gly Lys Ser Ser His Glu Ser Asp Ser Ser Asn Val Met
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 Ser Ser Ser Thr Asp Gln Leu Glu Ala Pro Gly Thr Val Ser Glu Glu
 80 85 90

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Ser Gln Val Leu Thr Asp Val Glu Ser Leu Ile Met Asp Asp Lys Ile	
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Val Glu Asp Glu Val Asn Lys Glu Ser Val Pro Met Arg Glu Thr Val	
115 120 125	
agc atc gga aaa att gga tct aaa cca agg tcc att cct cca ccc ggc	552
Ser Ile Gly Lys Ile Gly Ser Lys Pro Arg Ser Ile Pro Pro Pro Gly	
130 135 140	
aga ggg caa aga ata tat gac ata gat cca agc ttg aca ggc ttt cgt	600
Arg Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser Leu Thr Gly Phe Arg	
145 150 155	
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Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg Glu Glu	
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Ile Asp Lys Tyr Glu Gly Ser Leu Asp Ala Phe Ser Arg Gly Tyr Glu	
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Lys Phe Gly Phe Ser Arg Ser Glu Thr Gly Ile Thr Tyr Arg Glu Trp	
195 200 205	
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Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn Asn Trp	
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225 230 235	
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Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Asn Lys Asp Ser	
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att cct gct tgg atc aag ttc tca gtt caa gca cca ggt gaa ctc cca	984
Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu Leu Pro	
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Tyr Asn Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys Tyr Val Phe	
290 295 300	
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Lys Asn Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr Glu Ser	
305 310 315	

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His Val Gly Met Ser Ser Thr Glu Pro Val Ile Asn Thr Tyr Ala Asn	
320 325 330	
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Phe Arg Asp Asp Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr Asn Ala	
335 340 345 350	
gtt cag ctc atg gct att caa gag cat tca tat tat gct agt ttt ggg	1224
Val Gln Leu Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly	
355 360 365	
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Tyr His Val Thr Asn Phe Tyr Ala Ala Ser Ser Arg Phe Gly Thr Pro	
370 375 380	
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Asp Asp Leu Lys Ser Leu Val Asp Lys Ala His Glu Leu Gly Leu Leu	
385 390 395	
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Val Leu Met Asp Ile Val His Ser His Ala Ser Thr Asn Thr Leu Asp	
400 405 410	
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Gly Leu Asn Met Phe Asp Gly Thr Asp Gly His Tyr Phe His Ser Gly	
415 420 425 430	
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Pro Arg Gly His His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly	
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Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Thr Arg Trp Trp Leu	
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Asp Glu Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met	
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480 485 490	
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Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Val Tyr Leu Met	
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Leu Leu Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala Val Thr Ile	
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Gly Glu Asp Val Ser Gly Met Pro Thr Val Cys Ile Pro Val Glu Asp	
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Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Val Ala Asp Lys	
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Ile Val His Met Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys Val Ser	
575 580 585 590	
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<211> 2224

<212> DNA

<213> Manihot esculenta

<400> 42

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<213> Manihot esculenta

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<213> Manihot esculenta

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<213> Manihot esculenta

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His Ser Gly Ser Arg Gly His His Trp Met Trp Asp Ser Arg Leu Phe
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Val	Glu	Asp	Gly	Gly	Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	Ala	Val	
			180					185					190			
Ala	Asp	Lys	Trp	Val	Glu	Ile	Ile	Gln	Lys	Arg	Asp	Glu	Asp	Trp	Lys	
		195						200				205				
Met	Gly	Asp	Ile	Val	His	Met	Leu	Thr	Asn	Arg	Arg	Trp	Leu	Glu	Lys	
	210					215					220					
Cys	Val	Ser	Tyr	Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys	
225					230					235					240	
Thr	Ile	Ala	Phe	Trp	Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala	
			245						250					255		
Leu	Asp	Arg	Pro	Ser	Thr	Pro	Leu	Ile	Asp	Arg	Gly	Val	Ala	Leu	His	
			260					265					270			
Lys	Met	Ile	Arg	Leu	Ile	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	Tyr	Leu	
		275					280					285				
Asn	Phe	Met	Gly	Asn	Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	Phe	Pro	
	290					295					300					
Arg	Gly	Asp	Leu	His	Leu	Pro	Ser	Gly	Lys	Phe	Val	Pro	Gly	Asn	Asn	
305					310					315					320	
Tyr	Ser	Tyr	Asp	Lys	Cys	Arg	Arg	Arg	Phe	Asp	Leu	Gly	Asp	Asn	Ser	
			325						330					335		
Lys	His	Arg	Tyr	His	Gly	Met	Gln	Glu	Phe	Asp	Gln	Ala	Ile	Gln	His	
			340					345					350			
Leu	Glu	Glu	Ala	Tyr	Gly	Phe	Met	Thr	Ser	Glu	His	Gln	Tyr	Ile	Ser	
		355					360					365				
Arg	Lys	Asp	Glu	Gly	Asp	Arg	Ile	Ile	Val	Phe	Glu	Arg	Gly	Asn	Leu	
	370					375					380					
Val	Phe	Val	Phe	Asn	Phe	His	Trp	Thr	Ser	Ser	Tyr	Ser	Asp	Tyr	Arg	
385					390					395					400	
Val	Gly	Cys	Leu	Lys	Ser	Gly	Lys	Tyr	Lys	Ile	Val	Leu	Asp	Ser	Asp	
			405						410					415		

Asp Pro Leu Phe Gly Gly Phe Gly Arg Leu Ser His Asp Ala Glu His
 420 425 430

Phe Ser Phe Glu Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val
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Tyr Thr Pro Cys Arg Thr Ala Val Val Tyr Ala Leu Val Glu Asp Glu
 450 455 460

Val Glu Asn Glu Val Glu Pro Val Ala Gly
 465 470

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<211> 474

<212> PRT

<213> Manihot esculenta

<400> 47

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Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu
 20 25 30

Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn
 35 40 45

Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His Tyr Phe
 50 55 60

His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe
 65 70 75 80

Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg
 85 90 95

Trp Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val
 100 105 110

Thr Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe Thr Gly
 115 120 125

Asn Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Ile
 130 135 140

Tyr Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala
 145 150 155 160

Val Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys Ile Pro
 165 170 175

Val Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile
 180 185 190

Ala Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp Trp Lys

195					200					205						
Met	Gly	Asp	Ile	Val	His	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Leu	Glu	Lys	
210					215					220						
Cys	Val	Ala	Tyr	Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys	
225					230					235					240	
Thr	Ile	Ala	Phe	Trp	Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala	
245					250					255						
Arg	Asp	Arg	Pro	Ser	Thr	Pro	Leu	Ile	Asp	Arg	Gly	Ile	Ala	Leu	His	
260					265					270						
Lys	Met	Ile	Arg	Leu	Ile	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	Tyr	Leu	
275					280					285						
Asn	Phe	Met	Gly	Asn	Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	Phe	Pro	
290					295					300						
Arg	Gly	Asp	Arg	His	Leu	Pro	Asn	Gly	Lys	Val	Ile	Pro	Gly	Asn	Asn	
305					310					315					320	
His	Ser	Tyr	Asp	Lys	Cys	Arg	Arg	Arg	Phe	Asp	Leu	Gly	Asp	Ala	Asp	
325					330					335						
Tyr	Leu	Arg	Tyr	His	Gly	Met	Gln	Glu	Phe	Asp	Gln	Ala	Met	Gln	His	
340					345					350						
Leu	Glu	Glu	Ala	Tyr	Gly	Phe	Met	Thr	Ser	Glu	His	Gln	Tyr	Ile	Ser	
355					360					365						
Arg	Lys	Asp	Glu	Gly	Asp	Arg	Ile	Ile	Val	Phe	Glu	Arg	Gly	Asn	Leu	
370					375					380						
Val	Phe	Val	Phe	Asn	Phe	His	Trp	Thr	Asn	Ser	Tyr	Ser	Asp	Tyr	Arg	
385					390					395					400	
Val	Gly	Cys	Phe	Lys	Ser	Gly	Lys	Tyr	Lys	Ile	Val	Leu	Asp	Ser	Asp	
405					410					415						
Asp	Gly	Leu	Phe	Gly	Gly	Phe	Asn	Arg	Leu	Ser	His	Asp	Ala	Glu	His	
420					425					430						
Phe	Thr	Phe	Asp	Gly	Trp	Tyr	Asp	Asn	Arg	Pro	Arg	Ser	Phe	Met	Val	
435					440					445						
Tyr	Ala	Pro	Ser	Arg	Thr	Ala	Val	Val	His	Ala	Leu	Val	Glu	Asp	Glu	
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<211> 1069

<212> DNA
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<220>
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<400> 48

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cct ctc ata gat cgt gga gta gca ttg cac aaa atg atc agg ctt att	96
Pro Leu Ile Asp Arg Gly Val Ala Leu His Lys Met Ile Arg Leu Ile	
20 25 30	
acc atg gga tta ggc gga gaa gga tat ttg aat ttt atg gga aat gaa	144
Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly Asn Glu	
35 40 45	
ttt gga cac ccc gag tgg att gat ttt cca aga ggt gat cta cat ctt	192
Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Gly Asp Leu His Leu	
50 55 60	
ccc agt ggt aaa ttt gtt cct ggg aac aat tac agt tat gat aaa tgc	240
Pro Ser Gly Lys Phe Val Pro Gly Asn Asn Tyr Ser Tyr Asp Lys Cys	
65 70 75 80	
cgg cgt agg ttt gat cta ggc aat tca aag cgt ctg aga tat cat gga	288
Arg Arg Arg Phe Asp Leu Gly Asn Ser Lys Arg Leu Arg Tyr His Gly	
85 90 95	
atg caa gag ttt gat caa gca att cag cat ctt gaa gaa gcc tat ggt	336
Met Gln Glu Phe Asp Gln Ala Ile Gln His Leu Glu Glu Ala Tyr Gly	
100 105 110	
ttc atg act tct gag cac caa tac ata tca cgg aag gat gaa agg gat	384
Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg Lys Asp Glu Arg Asp	
115 120 125	
cgg atc att gtc ttc gag agg gga aac ctc gtt ttt gta ttc aat ttt	432
Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val Phe Val Phe Asn Phe	
130 135 140	
cat tgg act agc agc tat tcg gat tac cga gtt ggc tgc tta aag cca	480
His Trp Thr Ser Ser Tyr Ser Asp Tyr Arg Val Gly Cys Leu Lys Pro	
145 150 155 160	
gga aag tac aag ata gtc ttg gat tca gat gat cct ttg ttt gga ggc	528
Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp Pro Leu Phe Gly Gly	
165 170 175	
ttt ggc agg ctt agt cat gat gca gag cac ttc agc ttt gaa ggg tgg	576
Phe Gly Arg Leu Ser His Asp Ala Glu His Phe Ser Phe Glu Gly Trp	
180 185 190	
tac gat aac cgg cct cga tcc ttc atg gtg tac aca cca tgt aga aca	624

Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Thr Pro Cys Arg Thr
 195 200 205
 gca gtg gtc tat gct tta gtg gag gat gaa gtg gag aat gaa gtg gaa 672
 Ala Val Val Tyr Ala Leu Val Glu Asp Glu Val Glu Asn Glu Val Glu
 210 215 220
 cct gtc gcc ggt taagatatat cttagcaaca ggttctgaag caggaatgcc 724
 Pro Val Ala Gly
 225
 attattgatac ttcttatgtg catctgcggt gaacgaaata tattgagcct ataatttgat 784
 gtcacgggtcc ttgcagattt ccatcctggt tcttggtatt ttgttgatcat gataaacata 844
 atcaaagacc aataggaaac gcagggttac atgctagctt ccatcatcat agggagctca 904
 gacctcctaa accataaatc ttcaagctgc ctgcgttcgg tagtatgtta tgtggtactt 964
 tgcaatctta aattatcatg atcgctgtgg atgctaacta tgacaatttt gtatatatgc 1024
 caacgaggat ttttaagtttt aaaaaaaaaa caaaaaaat ccatg 1069

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 <211> 228
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 <213> Manihot esculenta

<400> 49
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 Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly Asn Glu
 35 40 45
 Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Gly Asp Leu His Leu
 50 55 60
 Pro Ser Gly Lys Phe Val Pro Gly Asn Asn Tyr Ser Tyr Asp Lys Cys
 65 70 75 80
 Arg Arg Arg Phe Asp Leu Gly Asn Ser Lys Arg Leu Arg Tyr His Gly
 85 90 95
 Met Gln Glu Phe Asp Gln Ala Ile Gln His Leu Glu Glu Ala Tyr Gly
 100 105 110
 Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg Lys Asp Glu Arg Asp
 115 120 125
 Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val Phe Val Phe Asn Phe
 130 135 140

His Trp Thr Ser Ser Tyr Ser Asp Tyr Arg Val Gly Cys Leu Lys Pro
 145 150 155 160
 Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp Pro Leu Phe Gly Gly
 165 170 175
 Phe Gly Arg Leu Ser His Asp Ala Glu His Phe Ser Phe Glu Gly Trp
 180 185 190
 Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Thr Pro Cys Arg Thr
 195 200 205
 Ala Val Val Tyr Ala Leu Val Glu Asp Glu Val Glu Asn Glu Val Glu
 210 215 220
 Pro Val Ala Gly
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 Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe
 1 5 10 15

gga act cct gat gat ttg aag tct tta ata gat aaa gct cat gag tta 156
 Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu
 20 25 30

ggg ctg ctt gtt ctc atg gat att gtt cat agc cat gcg tca aat aat 204
 Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn
 35 40 45

acg ttg gat ggg ctg aac atg ttt gat ggt acg gat agt cac tac ttc 252
 Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His Tyr Phe
 50 55 60

cac tcc gga tca cgg ggt cat cat tgg ttg tgg gac tct cgc ctt ttc 300
 His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe
 65 70 75 80

aac tat gga agc tgg gag gtg cta aga ttt ctt ctt tca aat gca aga 348
 Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg
 85 90 95

tgg tgg ttg gaa gag tac agg ttt gat ggt ttt aga ttt gat ggg gtg 396
 Trp Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val

100						105						110						
act	tcc	atg	atg	tac	act	ccc	cat	ggg	ttg	cag	gta	gct	ttt	act	ggc	444		
Thr	Ser	Met	Met	Tyr	Thr	Pro	His	Gly	Leu	Gln	Val	Ala	Phe	Thr	Gly			
115						120						125						
aac	tac	aat	gag	tac	ttt	gga	tat	gca	act	gat	gta	gat	gct	gtg	att	492		
Asn	Tyr	Asn	Glu	Tyr	Phe	Gly	Tyr	Ala	Thr	Asp	Val	Asp	Ala	Val	Ile			
130						135						140						
tat	ttg	atg	ctt	gtg	aat	gat	atg	att	cac	ggg	ctt	ttc	cct	gag	gct	540		
Tyr	Leu	Met	Leu	Val	Asn	Asp	Met	Ile	His	Gly	Leu	Phe	Pro	Glu	Ala			
145						150						155						160
gtt	acc	att	ggg	gaa	gat	gtt	agc	gga	aag	cca	aca	ttt	tgc	att	cca	588		
Val	Thr	Ile	Gly	Glu	Asp	Val	Ser	Gly	Lys	Pro	Thr	Phe	Cys	Ile	Pro			
165						170						175						
gtg	gaa	gat	ggg	ggg	gtt	gga	ttt	gat	tac	cgt	ctc	cac	atg	gcc	att	636		
Val	Glu	Asp	Gly	Gly	Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	Ala	Ile			
180						185						190						
gcc	gat	aaa	tgg	att	gag	att	ctt	aag	aag	aga	gat	gag	gac	tgg	aaa	684		
Ala	Asp	Lys	Trp	Ile	Glu	Ile	Leu	Lys	Lys	Arg	Asp	Glu	Asp	Trp	Lys			
195						200						205						
atg	ggg	gac	att	gtg	cat	aca	ctc	acc	aac	aga	agg	tgg	ttg	gaa	aaa	732		
Met	Gly	Asp	Ile	Val	His	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Leu	Glu	Lys			
210						215						220						
tgt	gtt	gct	tat	gct	gaa	agt	cat	gac	caa	gct	ctt	gtt	ggg	gac	aaa	780		
Cys	Val	Ala	Tyr	Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys			
225						230						235						240
act	att	gca	ttt	tgg	ctg	atg	gac	aag	gac	atg	tac	gac	ttc	atg	gct	828		
Thr	Ile	Ala	Phe	Trp	Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala			
245						250						255						
cgt	gac	aga	cca	tct	act	cct	ctt	ata	gat	cgt	gga	ata	gca	ttg	cac	876		
Arg	Asp	Arg	Pro	Ser	Thr	Pro	Leu	Ile	Asp	Arg	Gly	Ile	Ala	Leu	His			
260						265						270						
aaa	atg	atc	agg	ctt	att	acc	atg	ggc	tta	ggc	gga	gaa	gga	tat	ttg	924		
Lys	Met	Ile	Arg	Leu	Ile	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	Tyr	Leu			
275						280						285						
aat	ttt	atg	gga	aat	gaa	ttt	gga	cat	cct	gag	tgg	att	gat	ttt	cca	972		
Asn	Phe	Met	Gly	Asn	Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	Phe	Pro			
290						295						300						
aga	ggg	gat	cga	cat	ctg	ccc	aat	ggg	aaa	gta	att	cca	ggg	aac	aac	1020		
Arg	Gly	Asp	Arg	His	Leu	Pro	Asn	Gly	Lys	Val	Ile	Pro	Gly	Asn	Asn			
305						310						315						320
cac	agt	tat	gat	aaa	tgc	cgt	cgt	aga	ttt	gat	cta	ggg	gat	gca	gac	1068		
His	Ser	Tyr	Asp	Lys	Cys	Arg	Arg	Arg	Phe	Asp	Leu	Gly	Asp	Ala	Asp			

325	330	335	
tat cta aga tat cat gga atg caa gag ttt gat cag gca atg caa cat			1116
Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His			
340	345	350	
ctt gaa gaa gcc tat ggt ttc atg act tct gag cac cag tat ata tca			1164
Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser			
355	360	365	
cgg aag gat gaa gga gat cgg atc att gtc ttt gag agg gga aac ctt			1212
Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu			
370	375	380	
gtt ttt gta ttc aac ttt cat tgg act aac agc tat tca gat tac cga			1260
Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg			
385	390	395	400
gtt ggc tgc ttc aag tca gga aag tac aag att gtt ttg gac tcg gat			1308
Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp			
405	410	415	
gat ggc ttg ttt gga ggc ttc aac agg ctt agt cat gat gcc gag cac			1356
Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His			
420	425	430	
ttc acc ttt gac ggg tgg tat gat aac cgg cct cgg tcc ttc atg gta			1404
Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val			
435	440	445	
tat gca cca tct agg aca gca gtg gtc cat gct tta gta gaa gat gaa			1452
Tyr Ala Pro Ser Arg Thr Ala Val Val His Ala Leu Val Glu Asp Glu			
450	455	460	
gag aat gaa gca gag aat gaa gta gaa agt gaa gtg aaa cca gcc tcc			1500
Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser			
465	470	475	480
ggc tgagatagat atttagtaag aggatcccct aaagcaggaa tgggttaacct			1553
Gly			
gtgcatctgc attgaacgac gtatattgag acttgaattg atttgctgct caggacacag			1613
aatattaatt ccaaggctca aggcagagat acacgccatg atgcatgatc atatgaaagc			1673
tccccaaactt gtaaattcatt tagcaagctg cgtgcactct gtaaattata tgtagtactt			1733
tggcaagtca cggtattatg gataccatgg atgtccgcta ggaaaaattt tgtgtatacg			1793
cctactagga tttttaaatc tcgcatgttc cacataaagt ggtggttgaa tgttgcgcg			1853
ctatTTTTTga gtaaaatgat tgaagttatt cttcacttgg gcctgtgaaa aaaaaaaaaa			1913
aaaaaaaa			1921

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<211> 481
 <212> PRT
 <213> Manihot esculenta

<400> 51

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			20					25					30		
Gly	Leu	Leu	Val	Leu	Met	Asp	Ile	Val	His	Ser	His	Ala	Ser	Asn	Asn
	35						40					45			
Thr	Leu	Asp	Gly	Leu	Asn	Met	Phe	Asp	Gly	Thr	Asp	Ser	His	Tyr	Phe
	50					55					60				
His	Ser	Gly	Ser	Arg	Gly	His	His	Trp	Leu	Trp	Asp	Ser	Arg	Leu	Phe
	65				70					75					80
Asn	Tyr	Gly	Ser	Trp	Glu	Val	Leu	Arg	Phe	Leu	Leu	Ser	Asn	Ala	Arg
				85					90					95	
Trp	Trp	Leu	Glu	Glu	Tyr	Arg	Phe	Asp	Gly	Phe	Arg	Phe	Asp	Gly	Val
		100						105					110		
Thr	Ser	Met	Met	Tyr	Thr	Pro	His	Gly	Leu	Gln	Val	Ala	Phe	Thr	Gly
		115					120					125			
Asn	Tyr	Asn	Glu	Tyr	Phe	Gly	Tyr	Ala	Thr	Asp	Val	Asp	Ala	Val	Ile
	130					135					140				
Tyr	Leu	Met	Leu	Val	Asn	Asp	Met	Ile	His	Gly	Leu	Phe	Pro	Glu	Ala
145					150					155					160
Val	Thr	Ile	Gly	Glu	Asp	Val	Ser	Gly	Lys	Pro	Thr	Phe	Cys	Ile	Pro
			165						170					175	
Val	Glu	Asp	Gly	Gly	Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	Ala	Ile
		180						185					190		
Ala	Asp	Lys	Trp	Ile	Glu	Ile	Leu	Lys	Lys	Arg	Asp	Glu	Asp	Trp	Lys
		195					200					205			
Met	Gly	Asp	Ile	Val	His	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Leu	Glu	Lys
	210					215					220				
Cys	Val	Ala	Tyr	Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys
225					230					235					240
Thr	Ile	Ala	Phe	Trp	Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala
			245						250					255	
Arg	Asp	Arg	Pro	Ser	Thr	Pro	Leu	Ile	Asp	Arg	Gly	Ile	Ala	Leu	His
			260					265					270		

Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
 275 280 285
 Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
 290 295 300
 Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn
 305 310 315 320
 His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp
 325 330 335
 Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His
 340 345 350
 Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser
 355 360 365
 Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu
 370 375 380
 Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg
 385 390 395 400
 Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
 405 410 415
 Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His
 420 425 430
 Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val
 435 440 445
 Tyr Ala Pro Ser Arg Thr Ala Val Val His Ala Leu Val Glu Asp Glu
 450 455 460
 Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser
 465 470 475 480
 Gly

<210> 52
 <211> 2805
 <212> DNA
 <213> Manihot esculenta

<220>
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 <222> (131)..(2674)

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 tctcaccgaa atg gta tac tac act gta tca ggc ata cgt ttt cct tgt 169

	Met	Val	Tyr	Tyr	Thr	Val	Ser	Gly	Ile	Arg	Phe	Pro	Cys	
	1					5					10			
gca cct tca ctc tac aaa tct cag ctc acc agc ttc cat ggc ggt cga	217													
Ala Pro Ser Leu Tyr Lys Ser Gln Leu Thr Ser Phe His Gly Gly Arg														
15 20 25														
agg acc tct tct ggc ctt tcc ttc ctc ttg aag aag gag ctg ttt cct	265													
Arg Thr Ser Ser Gly Leu Ser Phe Leu Leu Lys Lys Glu Leu Phe Pro														
30 35 40 45														
cgg aag atc ttt gct gga aag tcc tct tat gaa tct gac tcc tca aat	313													
Arg Lys Ile Phe Ala Gly Lys Ser Ser Tyr Glu Ser Asp Ser Ser Asn														
50 55 60														
tta act gtc tct gca tct gag aag gtc ctt gtt cct gat gat cag att	361													
Leu Thr Val Ser Ala Ser Glu Lys Val Leu Val Pro Asp Asp Gln Ile														
65 70 75														
gat ggc tct tct tct tca aca tat caa tta gaa acc act ggc aca gtt	409													
Asp Gly Ser Ser Ser Ser Thr Tyr Gln Leu Glu Thr Thr Gly Thr Val														
80 85 90														
ttg gag gaa tcc cag gtt ctt ggt gat gca gag agt ctt gtg atg gaa	457													
Leu Glu Glu Ser Gln Val Leu Gly Asp Ala Glu Ser Leu Val Met Glu														
95 100 105														
gat gat aag aat gtt gag gag gat gaa gta aaa aaa gag tcg gtt cca	505													
Asp Asp Lys Asn Val Glu Glu Asp Glu Val Lys Lys Glu Ser Val Pro														
110 115 120 125														
ttg cat gag aca att agc att gga aaa agt gaa tct aaa cca agg tcc	553													
Leu His Glu Thr Ile Ser Ile Gly Lys Ser Glu Ser Lys Pro Arg Ser														
130 135 140														
att cct cca cct ggc agt ggg cag aga ata tat gac ata gat cca agc	601													
Ile Pro Pro Pro Gly Ser Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser														
145 150 155														
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Leu Ala Gly Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys														
160 165 170														
agg ctg cgt gag gaa att gac aag tat gaa ggt ggt ttg gat gca ttc	697													
Arg Leu Arg Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Asp Ala Phe														
175 180 185														
tct cgt gga ttt gaa aag ttt ggt ttc tta cgc agt gaa aca gga ata	745													
Ser Arg Gly Phe Glu Lys Phe Gly Phe Leu Arg Ser Glu Thr Gly Ile														
190 195 200 205														
act tat agg gaa tgg gca cct gga gct acg tgg gct gca ctt att gga	793													
Thr Tyr Arg Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly														
210 215 220														
gat ttc aac aat tgg aat cct aat gca gat gtc atg act cgg aat gag	841													
Asp Phe Asn Asn Trp Asn Pro Asn Ala Asp Val Met Thr Arg Asn Glu														

225						230						235						
ttt ggt gtc tgg gag att ttt ttg cca aat aac gca gat ggt tca cca	889																	
Phe Gly Val Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro																		
240 245 250																		
cca att cct cat ggt tct cga gta aag ata cgc atg gat act cca tct	937																	
Pro Ile Pro His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser																		
255 260 265																		
ggc atc aaa gat tca att cct gct tgg atc aag ttc tca gtt cag gca	985																	
Gly Ile Lys Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala																		
270 275 280 285																		
cct ggt gaa atc cca tac aat gcc ata tac tat gat cca cca aag gag	1033																	
Pro Gly Glu Ile Pro Tyr Asn Ala Ile Tyr Tyr Asp Pro Pro Lys Glu																		
290 295 300																		
gag aag tat gtg ttc aaa cat cct cag cca aag aga cca aaa tca ctt	1081																	
Glu Lys Tyr Val Phe Lys His Pro Gln Pro Lys Arg Pro Lys Ser Leu																		
305 310 315																		
agg att tat gaa tct cat gtt ggg atg agt agt atg gag cca ata att	1129																	
Arg Ile Tyr Glu Ser His Val Gly Met Ser Ser Met Glu Pro Ile Ile																		
320 325 330																		
aac aca tat gcc aac ttt aga gat gat atg ctt cct cgc atc aaa aag	1177																	
Asn Thr Tyr Ala Asn Phe Arg Asp Asp Met Leu Pro Arg Ile Lys Lys																		
335 340 345																		
ctt ggc tac aat gct gtt cag atc atg gct att caa gag cat tcc tat	1225																	
Leu Gly Tyr Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr																		
350 355 360 365																		
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Tyr Ala Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser																		
370 375 380																		
cga ttt gga act cct gat gat ttg aag tct tta ata gat aaa gct cat	1321																	
Arg Phe Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His																		
385 390 395																		
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Glu Leu Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser																		
400 405 410																		
aat aat acg ttg gat ggg ctg aac atg ttt gat ggt acg gat agt cac	1417																	
Asn Asn Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His																		
415 420 425																		
tac ttc cac tcc gga tca cgg ggt cat cat tgg ttg tgg gac tct cgc	1465																	
Tyr Phe His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg																		
430 435 440 445																		
ctt ttc aac tat gga agc tgg gag gtg cta aga ttt ctt ctt tca aat	1513																	

Leu	Phe	Asn	Tyr	Gly	Ser	Trp	Glu	Val	Leu	Arg	Phe	Leu	Leu	Ser	Asn	
				450					455					460		
gca	aga	tgg	tgg	ttg	gaa	gag	tac	agg	ttt	gat	ggg	ttt	aga	ttt	gat	1561
Ala	Arg	Trp	Trp	Leu	Glu	Glu	Tyr	Arg	Phe	Asp	Gly	Phe	Arg	Phe	Asp	
				465				470					475			
ggg	gtg	act	tcc	atg	atg	tac	act	ccc	cat	ggg	ttg	cag	gta	gct	ttt	1609
Gly	Val	Thr	Ser	Met	Met	Tyr	Thr	Pro	His	Gly	Leu	Gln	Val	Ala	Phe	
			480				485					490				
act	ggc	aac	tac	aat	gag	tac	ttt	gga	tat	gca	act	gat	gta	gat	gct	1657
Thr	Gly	Asn	Tyr	Asn	Glu	Tyr	Phe	Gly	Tyr	Ala	Thr	Asp	Val	Asp	Ala	
	495					500					505					
gtg	att	tat	ttg	atg	ctt	gtg	aat	gat	atg	att	cac	ggg	ctt	ttc	cct	1705
Val	Ile	Tyr	Leu	Met	Leu	Val	Asn	Asp	Met	Ile	His	Gly	Leu	Phe	Pro	
510					515					520					525	
gag	gct	gtt	acc	att	ggg	gaa	gat	gtt	agc	gga	aag	cca	aca	ttt	tgc	1753
Glu	Ala	Val	Thr	Ile	Gly	Glu	Asp	Val	Ser	Gly	Lys	Pro	Thr	Phe	Cys	
				530				535						540		
att	cca	gtg	gaa	gat	ggg	ggg	gtt	gga	ttt	gat	tac	cgt	ctc	cac	atg	1801
Ile	Pro	Val	Glu	Asp	Gly	Gly	Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	
			545				550						555			
gcc	att	gcc	gat	aaa	tgg	att	gag	att	ctt	aag	aag	aga	gat	gag	gac	1849
Ala	Ile	Ala	Asp	Lys	Trp	Ile	Glu	Ile	Leu	Lys	Lys	Arg	Asp	Glu	Asp	
		560					565					570				
tgg	aaa	atg	ggg	gac	att	gtg	cat	aca	ctc	acc	aac	aga	agg	tgg	ttg	1897
Trp	Lys	Met	Gly	Asp	Ile	Val	His	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Leu	
	575					580					585					
gaa	aaa	tgt	gtt	gct	tat	gct	gaa	agt	cat	gac	caa	gct	ctt	gtt	ggg	1945
Glu	Lys	Cys	Val	Ala	Tyr	Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	
590					595				600						605	
gac	aaa	act	att	gca	ttt	tgg	ctg	atg	gac	aag	gac	atg	tac	gac	ttc	1993
Asp	Lys	Thr	Ile	Ala	Phe	Trp	Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	
				610				615					620			
atg	gct	cgt	gac	aga	cca	tct	act	cct	ctt	ata	gat	cgt	gga	ata	gca	2041
Met	Ala	Arg	Asp	Arg	Pro	Ser	Thr	Pro	Leu	Ile	Asp	Arg	Gly	Ile	Ala	
			625					630					635			
ttg	cac	aaa	atg	atc	agg	ctt	att	acc	atg	ggc	tta	ggc	gga	gaa	gga	2089
Leu	His	Lys	Met	Ile	Arg	Leu	Ile	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	
		640					645					650				
tat	ttg	aat	ttt	atg	gga	aat	gaa	ttt	gga	cat	cct	gag	tgg	att	gat	2137
Tyr	Leu	Asn	Phe	Met	Gly	Asn	Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	
	655					660					665					

ttt cca aga ggg gat cga cat ctg ccc aat ggt aaa gta att cca ggg	2185
Phe Pro Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly	
670 675 680 685	
aac aac cac agt tat gat aaa tgc cgt cgt aga ttt gat cta ggt gat	2233
Asn Asn His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp	
690 695 700	
gca gac tat cta aga tat cat gga atg caa gag ttt gat cag gca atg	2281
Ala Asp Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met	
705 710 715	
caa cat ctt gaa gaa gcc tat ggt ttc atg act tct gag cac cag tat	2329
Gln His Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr	
720 725 730	
ata tca cgg aag gat gaa gga gat cgg atc att gtc ttt gag agg gga	2377
Ile Ser Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly	
735 740 745	
aac ctt gtt ttt gta ttc aac ttt cat tgg act aac agc tat tca gat	2425
Asn Leu Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp	
750 755 760 765	
tac cga gtt ggc tgc ttc aag tca gga aag tac aag att gtt ttg gac	2473
Tyr Arg Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp	
770 775 780	
tcg gat gat ggc ttg ttt gga ggc ttc aac agg ctt agt cat gat gcc	2521
Ser Asp Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala	
785 790 795	
gag cac ttc acc ttt gac ggg tgg tat gat aac cgg cct cgg tcc ttc	2569
Glu His Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe	
800 805 810	
atg gta tat gca cca tct agg aca gca gtg gtc tat gct tta gta gaa	2617
Met Val Tyr Ala Pro Ser Arg Thr Ala Val Val Tyr Ala Leu Val Glu	
815 820 825	
gat gaa gag aat gaa gca gag aat gaa gta gaa agt gaa gtg aaa cca	2665
Asp Glu Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro	
830 835 840 845	
gcc tcc ggc tgagatagat atttagtaag aggatcccct aaagcaggaa	2714
Ala Ser Gly	
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gtagatcctc tagagtcgac ctgcaggcat g	2805
<210> 53	
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<213> Manihot esculenta	
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Met	Val	Tyr	Tyr	Thr	Val	Ser	Gly	Ile	Arg	Phe	Pro	Cys	Ala	Pro	Ser	1	5	10	15
Leu	Tyr	Lys	Ser	Gln	Leu	Thr	Ser	Phe	His	Gly	Gly	Arg	Arg	Thr	Ser	20	25	30	
Ser	Gly	Leu	Ser	Phe	Leu	Leu	Lys	Lys	Glu	Leu	Phe	Pro	Arg	Lys	Ile	35	40	45	
Phe	Ala	Gly	Lys	Ser	Ser	Tyr	Glu	Ser	Asp	Ser	Ser	Asn	Leu	Thr	Val	50	55	60	
Ser	Ala	Ser	Glu	Lys	Val	Leu	Val	Pro	Asp	Asp	Gln	Ile	Asp	Gly	Ser	65	70	75	
Ser	Ser	Ser	Thr	Tyr	Gln	Leu	Glu	Thr	Thr	Gly	Thr	Val	Leu	Glu	Glu	85	90	95	
Ser	Gln	Val	Leu	Gly	Asp	Ala	Glu	Ser	Leu	Val	Met	Glu	Asp	Asp	Lys	100	105	110	
Asn	Val	Glu	Glu	Asp	Glu	Val	Lys	Lys	Glu	Ser	Val	Pro	Leu	His	Glu	115	120	125	
Thr	Ile	Ser	Ile	Gly	Lys	Ser	Glu	Ser	Lys	Pro	Arg	Ser	Ile	Pro	Pro	130	135	140	
Pro	Gly	Ser	Gly	Gln	Arg	Ile	Tyr	Asp	Ile	Asp	Pro	Ser	Leu	Ala	Gly	145	150	155	
Phe	Arg	Gln	His	Leu	Asp	Tyr	Arg	Tyr	Ser	Gln	Tyr	Lys	Arg	Leu	Arg	165	170	175	
Glu	Glu	Ile	Asp	Lys	Tyr	Glu	Gly	Gly	Leu	Asp	Ala	Phe	Ser	Arg	Gly	180	185	190	
Phe	Glu	Lys	Phe	Gly	Phe	Leu	Arg	Ser	Glu	Thr	Gly	Ile	Thr	Tyr	Arg	195	200	205	
Glu	Trp	Ala	Pro	Gly	Ala	Thr	Trp	Ala	Ala	Leu	Ile	Gly	Asp	Phe	Asn	210	215	220	
Asn	Trp	Asn	Pro	Asn	Ala	Asp	Val	Met	Thr	Arg	Asn	Glu	Phe	Gly	Val	225	230	235	
Trp	Glu	Ile	Phe	Leu	Pro	Asn	Asn	Ala	Asp	Gly	Ser	Pro	Pro	Ile	Pro	245	250	255	
His	Gly	Ser	Arg	Val	Lys	Ile	Arg	Met	Asp	Thr	Pro	Ser	Gly	Ile	Lys	260	265	270	
Asp	Ser	Ile	Pro	Ala	Trp	Ile	Lys	Phe	Ser	Val	Gln	Ala	Pro	Gly	Glu	275	280	285	
Ile	Pro	Tyr	Asn	Ala	Ile	Tyr	Tyr	Asp	Pro	Pro	Lys	Glu	Glu	Lys	Tyr	290	295	300	

Val	Phe	Lys	His	Pro	Gln	Pro	Lys	Arg	Pro	Lys	Ser	Leu	Arg	Ile	Tyr	305	310	315	320
Glu	Ser	His	Val	Gly	Met	Ser	Ser	Met	Glu	Pro	Ile	Ile	Asn	Thr	Tyr	325	330	335	
Ala	Asn	Phe	Arg	Asp	Asp	Met	Leu	Pro	Arg	Ile	Lys	Lys	Leu	Gly	Tyr	340	345	350	
Asn	Ala	Val	Gln	Ile	Met	Ala	Ile	Gln	Glu	His	Ser	Tyr	Tyr	Ala	Ser	355	360	365	
Phe	Gly	Tyr	His	Val	Thr	Asn	Phe	Phe	Ala	Pro	Ser	Ser	Arg	Phe	Gly	370	375	380	
Thr	Pro	Asp	Asp	Leu	Lys	Ser	Leu	Ile	Asp	Lys	Ala	His	Glu	Leu	Gly	385	390	395	400
Leu	Leu	Val	Leu	Met	Asp	Ile	Val	His	Ser	His	Ala	Ser	Asn	Asn	Thr	405	410	415	
Leu	Asp	Gly	Leu	Asn	Met	Phe	Asp	Gly	Thr	Asp	Ser	His	Tyr	Phe	His	420	425	430	
Ser	Gly	Ser	Arg	Gly	His	His	Trp	Leu	Trp	Asp	Ser	Arg	Leu	Phe	Asn	435	440	445	
Tyr	Gly	Ser	Trp	Glu	Val	Leu	Arg	Phe	Leu	Leu	Ser	Asn	Ala	Arg	Trp	450	455	460	
Trp	Leu	Glu	Glu	Tyr	Arg	Phe	Asp	Gly	Phe	Arg	Phe	Asp	Gly	Val	Thr	465	470	475	480
Ser	Met	Met	Tyr	Thr	Pro	His	Gly	Leu	Gln	Val	Ala	Phe	Thr	Gly	Asn	485	490	495	
Tyr	Asn	Glu	Tyr	Phe	Gly	Tyr	Ala	Thr	Asp	Val	Asp	Ala	Val	Ile	Tyr	500	505	510	
Leu	Met	Leu	Val	Asn	Asp	Met	Ile	His	Gly	Leu	Phe	Pro	Glu	Ala	Val	515	520	525	
Thr	Ile	Gly	Glu	Asp	Val	Ser	Gly	Lys	Pro	Thr	Phe	Cys	Ile	Pro	Val	530	535	540	
Glu	Asp	Gly	Gly	Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	Ala	Ile	Ala	545	550	555	560
Asp	Lys	Trp	Ile	Glu	Ile	Leu	Lys	Lys	Arg	Asp	Glu	Asp	Trp	Lys	Met	565	570	575	
Gly	Asp	Ile	Val	His	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Leu	Glu	Lys	Cys	580	585	590	
Val	Ala	Tyr	Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys	Thr	595	600	605	

Tyr	Lys	Ser	Asn	Gly	Phe	Ser	Ser	Asn	Gly	Asp	Arg	Arg	Asn	Ala	Asn		
			20					25					30				
Val	Ser	Val	Phe	Leu	Lys	Lys	His	Ser	Leu	Ser	Arg	Lys	Ile	Leu	Ala		
		35					40					45					
Glu	Lys	Ser	Ser	Tyr	Asn	Ser	Glu	Phe	Arg	Pro	Ser	Thr	Val	Ala	Ala		
	50					55					60						
Ser	Gly	Lys	Val	Leu	Val	Pro	Gly	Thr	Gln	Ser	Asp	Ser	Ser	Ser	Ser		
65					70					75					80		
Ser	Thr	Asp	Gln	Phe	Glu	Phe	Thr	Glu	Thr	Ser	Pro	Glu	Asn	Ser	Pro		
			85					90					95				
Ala	Ser	Thr	Asp	Val	Asp	Ser	Ser	Thr	Met	Glu	His	Ala	Ser	Gln	Ile		
			100					105					110				
Lys	Thr	Glu	Asn	Asp	Asp	Val	Glu	Pro	Ser	Ser	Asp	Leu	Thr	Gly	Ser		
		115					120					125					
Val	Glu	Glu	Leu	Asp	Phe	Ala	Ser	Ser	Leu	Gln	Leu	Gln	Glu	Gly	Gly		
	130					135					140						
Lys	Leu	Glu	Glu	Ser	Lys	Thr	Leu	Asn	Thr	Ser	Glu	Glu	Thr	Ile	Ile		
145					150					155					160		
Asp	Glu	Ser	Asp	Arg	Ile	Arg	Glu	Arg	Gly	Ile	Pro	Pro	Pro	Gly	Leu		
				165					170					175			
Gly	Gln	Lys	Ile	Tyr	Glu	Ile	Asp	Pro	Leu	Leu	Thr	Asn	Tyr	Arg	Gln		
		180						185					190				
His	Leu	Asp	Tyr	Arg	Tyr	Ser	Gln	Tyr	Lys	Lys	Leu	Arg	Glu	Ala	Ile		
		195					200					205					
Asp	Lys	Tyr	Glu	Gly	Gly	Leu	Glu	Ala	Phe	Ser	Arg	Gly	Tyr	Glu	Lys		
	210					215					220						
Met	Gly	Phe	Thr	Arg	Ser	Ala	Thr	Gly	Ile	Thr	Tyr	Arg	Glu	Trp	Ala		
225					230					235					240		
Leu	Gly	Ala	Gln	Ser	Ala	Ala	Leu	Ile	Gly	Asp	Phe	Asn	Asn	Trp	Asp		
				245					250					255			
Ala	Asn	Ala	Asp	Ile	Met	Thr	Arg	Asn	Glu	Phe	Gly	Val	Trp	Glu	Ile		
			260					265					270				
Phe	Leu	Pro	Asn	Asn	Val	Asp	Gly	Ser	Pro	Ala	Ile	Pro	His	Gly	Ser		
	275						280					285					
Arg	Val	Lys	Ile	Arg	Met	Asp	Thr	Pro	Ser	Gly	Val	Lys	Asp	Ser	Ile		
	290					295					300						
Pro	Ala	Trp	Ile	Asn	Tyr	Ser	Leu	Gln	Leu	Pro	Asp	Glu	Ile	Pro	Tyr		
305				310						315				320			

Asn Gly Ile His Tyr Asp Pro Pro Glu Glu Glu Arg Tyr Ile Phe Gln
 325 330 335
 His Pro Arg Pro Lys Lys Pro Lys Ser Leu Arg Ile Tyr Glu Ser His
 340 345 350
 Ile Gly Met Ser Ser Pro Glu Pro Lys Ile Asn Ser Tyr Val Asn Phe
 355 360 365
 Arg Asp Glu Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr Asn Ala Leu
 370 375 380
 Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly Tyr
 385 390 395 400
 His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe Gly Thr Pro Asp
 405 410 415
 Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu Gly Ile Val Val
 420 425 430
 Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn Thr Leu Asp Gly
 435 440 445
 Leu Asn Met Phe Asp Cys Thr Asp Ser Cys Tyr Phe His Ser Gly Ala
 450 455 460
 Arg Gly Tyr His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly Asn
 465 470 475 480
 Trp Glu Val Leu Arg Tyr Leu Leu Ser Asn Ala Arg Trp Ala Leu Asp
 485 490 495
 Ala Phe Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met Met
 500 505 510
 Tyr Ile His His Gly Leu Ser Val Gly Phe Thr Gly Asn Tyr Glu Glu
 515 520 525
 Tyr Phe Gly Leu Ala Thr Asp Val Asp Ala Val Val Tyr Leu Met Leu
 530 535 540
 Val Asn Asp Leu Ile His Gly Leu Pro Pro Asp Ala Ile Thr Ile Gly
 545 550 555 560
 Glu Asp Val Ser Gly His Pro Thr Phe Cys Asp Pro Val Gln Glu Gly
 565 570 575
 Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile Ala Asp Lys Arg
 580 585 590
 Ile Glu Leu Leu Lys Lys Arg Asp Glu Asp Trp Arg Val Gly Asp Ile
 595 600 605
 Val His Thr Leu Thr Asn Arg Arg Trp Ser Glu Lys Cys Val Ser Tyr
 610 615 620

Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys	Thr	Ile	Ala	Phe	
625					630					635					640	
Trp	Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala	Leu	Asp	Arg	Pro	
				645					650					655		
Ser	Thr	Ser	Leu	Ile	Asp	Arg	Gly	Ile	Ala	Leu	His	Lys	Met	Ile	Arg	
			660					665					670			
Leu	Val	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	Tyr	Leu	Asn	Phe	Met	Gly	
		675					680					685				
Asn	Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	Phe	Pro	Arg	Ala	Glu	Gln	
	690					695					700					
His	Leu	Ser	Asp	Gly	Ser	Val	Ile	Pro	Gly	Asn	Gln	Phe	Ser	Tyr	Asp	
705					710					715					720	
Lys	Cys	Arg	Arg	Arg	Phe	Asp	Leu	Gly	Asp	Ala	Glu	Tyr	Leu	Arg	Tyr	
				725					730					735		
Arg	Gly	Leu	Gln	Glu	Phe	Asp	Arg	Pro	Met	Gln	Tyr	Leu	Glu	Asp	Lys	
		740						745					750			
Tyr	Glu	Phe	Met	Thr	Ser	Glu	His	Gln	Phe	Ile	Ser	Arg	Lys	Asp	Glu	
		755					760					765				
Gly	Asp	Arg	Met	Ile	Val	Phe	Glu	Lys	Gly	Asn	Leu	Val	Phe	Val	Phe	
	770					775					780					
Asn	Phe	His	Trp	Thr	Lys	Ser	Tyr	Ser	Asp	Tyr	Arg	Ile	Ala	Cys	Leu	
785					790					795					800	
Lys	Pro	Gly	Lys	Tyr	Lys	Val	Ala	Leu	Asp	Ser	Asp	Asp	Pro	Leu	Phe	
				805					810					815		
Gly	Gly	Phe	Gly	Arg	Ile	Asp	His	Asn	Ala	Glu	Tyr	Phe	Thr	Phe	Glu	
			820					825					830			
Gly	Trp	Tyr	Asp	Asp	Arg	Pro	Arg	Ser	Ile	Met	Val	Tyr	Ala	Pro	Cys	
		835					840					845				
Lys	Thr	Ala	Val	Val	Tyr	Ala	Leu	Val	Asp	Lys	Glu	Glu	Glu	Glu	Glu	
	850					855					860					
Glu	Glu	Glu	Val	Ala	Ala	Val	Glu	Glu	Val	Val	Val	Glu	Glu	Glu		
865					870					875						

<210> 55
 <211> 922
 <212> PRT
 <213> Pisum sativum

<400> 55

Met	Val	Tyr	Thr	Ile	Ser	Gly	Ile	Arg	Phe	Pro	Val	Leu	Pro	Ser	Leu	1	5	10	15
His	Lys	Ser	Thr	Leu	Arg	Cys	Asp	Arg	Arg	Ala	Ser	Ser	His	Ser	Phe	20	25	30	
Phe	Leu	Lys	Asn	Asn	Ser	Ser	Ser	Phe	Ser	Arg	Thr	Ser	Leu	Tyr	Ala	35	40	45	
Lys	Phe	Ser	Arg	Asp	Ser	Glu	Thr	Lys	Ser	Ser	Thr	Ile	Ala	Glu	Ser	50	55	60	
Asp	Lys	Val	Leu	Ile	Pro	Glu	Asp	Gln	Asp	Asn	Ser	Val	Ser	Leu	Ala	65	70	75	80
Asp	Gln	Leu	Glu	Asn	Pro	Asp	Ile	Thr	Ser	Glu	Asp	Ala	Gln	Asn	Leu	85	90	95	
Glu	Asp	Leu	Thr	Met	Lys	Asp	Gly	Asn	Lys	Tyr	Asn	Ile	Asp	Glu	Ser	100	105	110	
Thr	Ser	Ser	Tyr	Arg	Glu	Val	Gly	Asp	Glu	Lys	Gly	Ser	Val	Thr	Ser	115	120	125	
Ser	Ser	Leu	Val	Asp	Val	Asn	Thr	Asp	Thr	Gln	Ala	Lys	Lys	Thr	Ser	130	135	140	
Val	His	Ser	Asp	Lys	Lys	Val	Lys	Val	Asp	Lys	Pro	Lys	Ile	Ile	Pro	145	150	155	160
Pro	Pro	Gly	Thr	Gly	Gln	Lys	Ile	Tyr	Glu	Ile	Asp	Pro	Leu	Leu	Gln	165	170	175	
Ala	His	Arg	Gln	His	Leu	Asp	Phe	Arg	Tyr	Gly	Gln	Tyr	Lys	Arg	Ile	180	185	190	
Arg	Glu	Glu	Ile	Asp	Lys	Tyr	Glu	Gly	Gly	Leu	Asp	Ala	Phe	Ser	Arg	195	200	205	
Gly	Tyr	Glu	Lys	Phe	Gly	Phe	Thr	Arg	Ser	Ala	Thr	Gly	Ile	Thr	Tyr	210	215	220	
Arg	Glu	Trp	Ala	Pro	Gly	Ala	Lys	Ser	Ala	Ala	Leu	Val	Gly	Asp	Phe	225	230	235	240
Asn	Asn	Trp	Asn	Pro	Asn	Ala	Asp	Val	Met	Thr	Lys	Asp	Ala	Phe	Gly	245	250	255	
Val	Trp	Glu	Ile	Phe	Leu	Pro	Asn	Asn	Ala	Asp	Gly	Ser	Pro	Pro	Ile	260	265	270	
Pro	His	Gly	Ser	Arg	Val	Lys	Ile	His	Met	Asp	Thr	Pro	Ser	Gly	Ile	275	280	285	
Lys	Asp	Ser	Ile	Pro	Ala	Trp	Ile	Lys	Phe	Ser	Val	Gln	Ala	Pro	Gly	290	295	300	

Glu	Ile	Pro	Tyr	Asn	Gly	Ile	Tyr	Tyr	Asp	Pro	Pro	Glu	Glu	Glu	Lys	305	310	315	320
Tyr	Val	Phe	Lys	His	Pro	Gln	Pro	Lys	Arg	Pro	Gln	Ser	Ile	Arg	Ile	325	330	335	
Tyr	Glu	Ser	His	Ile	Gly	Met	Ser	Ser	Pro	Glu	Pro	Lys	Ile	Asn	Thr	340	345	350	
Tyr	Ala	Asn	Phe	Arg	Asp	Asp	Val	Leu	Pro	Arg	Ile	Lys	Lys	Leu	Gly	355	360	365	
Tyr	Asn	Ala	Val	Gln	Ile	Met	Ala	Ile	Gln	Glu	His	Ser	Tyr	Tyr	Ala	370	375	380	
Ser	Phe	Gly	Tyr	His	Val	Thr	Asn	Phe	Phe	Ala	Pro	Ser	Ser	Arg	Phe	385	390	395	400
Gly	Thr	Pro	Glu	Asp	Leu	Lys	Ser	Leu	Ile	Asp	Arg	Ala	His	Glu	Leu	405	410	415	
Gly	Leu	Leu	Val	Leu	Met	Asp	Ile	Val	His	Ser	His	Ser	Ser	Asn	Asn	420	425	430	
Thr	Leu	Asp	Gly	Leu	Asn	Met	Phe	Asp	Gly	Thr	Asp	Gly	His	Tyr	Phe	435	440	445	
His	Pro	Gly	Ser	Arg	Gly	Tyr	His	Trp	Met	Trp	Asp	Ser	Arg	Leu	Phe	450	455	460	
Asn	Tyr	Gly	Ser	Trp	Glu	Val	Leu	Arg	Tyr	Leu	Leu	Ser	Asn	Ala	Arg	465	470	475	480
Trp	Ala	Leu	Asp	Glu	Tyr	Lys	Phe	Asp	Gly	Phe	Arg	Phe	Asp	Gly	Val	485	490	495	
Thr	Ser	Met	Met	Tyr	Thr	His	His	Gly	Leu	Gln	Val	Ser	Phe	Thr	Gly	500	505	510	
Asn	Tyr	Ser	Glu	Tyr	Phe	Gly	Leu	Ala	Thr	Asp	Val	Glu	Ala	Val	Val	515	520	525	
Tyr	Met	Met	Leu	Val	Asn	Asp	Leu	Ile	His	Gly	Leu	Pro	Pro	Glu	Ala	530	535	540	
Val	Ser	Ile	Gly	Glu	Asp	Val	Ser	Gly	Met	Pro	Thr	Phe	Cys	Leu	Pro	545	550	555	560
Thr	Gln	Asp	Gly	Gly	Ile	Gly	Phe	Asn	Tyr	Arg	Leu	His	Met	Ala	Val	565	570	575	
Ala	Asp	Lys	Trp	Ile	Glu	Leu	Leu	Lys	Lys	Gln	Asp	Glu	Asp	Trp	Arg	580	585	590	
Met	Gly	Asp	Ile	Val	His	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Leu	Glu	Lys	595	600	605	

Cys	Val	Val	Tyr	Ala	Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys	610	615	620	
Thr	Leu	Ala	Phe	Trp	Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala	625	630	635	640
Leu	Asp	Arg	Pro	Ser	Thr	Pro	Leu	Ile	Asp	Arg	Gly	Ile	Ala	Leu	His	645	650	655	
Lys	Met	Ile	Arg	Leu	Ile	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	Tyr	Leu	660	665	670	
Asn	Phe	Met	Gly	Asn	Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	Phe	Pro	675	680	685	
Arg	Gly	Glu	Gln	His	Leu	Pro	Asn	Gly	Lys	Ile	Val	Pro	Gly	Asn	Asn	690	695	700	
Asn	Ser	Tyr	Asp	Lys	Cys	Arg	Arg	Arg	Phe	Asp	Leu	Gly	Asp	Ala	Asp	705	710	715	720
Tyr	Leu	Arg	Tyr	His	Gly	Met	Gln	Glu	Phe	Asp	Arg	Ala	Met	Gln	His	725	730	735	
Leu	Glu	Glu	Arg	Tyr	Gly	Phe	Met	Thr	Ser	Glu	His	Gln	Tyr	Ile	Ser	740	745	750	
Arg	Lys	Asn	Glu	Gly	Asp	Arg	Val	Ile	Ile	Phe	Glu	Arg	Asp	Asn	Leu	755	760	765	
Val	Phe	Val	Phe	Asn	Phe	His	Trp	Thr	Asn	Ser	Tyr	Ser	Asp	Tyr	Lys	770	775	780	
Val	Gly	Cys	Leu	Lys	Pro	Gly	Lys	Tyr	Lys	Ile	Val	Leu	Asp	Ser	Asp	785	790	795	800
Asp	Thr	Leu	Phe	Gly	Gly	Phe	Asn	Arg	Leu	Asn	His	Thr	Ala	Glu	Tyr	805	810	815	
Phe	Thr	Ser	Glu	Gly	Trp	Tyr	Asp	Asp	Arg	Pro	Arg	Ser	Phe	Leu	Val	820	825	830	
Tyr	Ala	Pro	Ser	Arg	Thr	Ala	Val	Val	Tyr	Ala	Leu	Ala	Asp	Gly	Val	835	840	845	
Glu	Ser	Glu	Pro	Ile	Glu	Leu	Ser	Asp	Gly	Val	Glu	Ser	Glu	Pro	Ile	850	855	860	
Glu	Leu	Ser	Val	Gly	Val	Glu	Ser	Glu	Pro	Ile	Glu	Leu	Ser	Val	Glu	865	870	875	880
Glu	Ala	Glu	Ser	Glu	Pro	Ile	Glu	Arg	Ser	Val	Glu	Glu	Val	Glu	Ser	885	890	895	
Glu	Thr	Thr	Gln	Gln	Ser	Val	Glu	Val	Glu	Ser	Glu	Thr	Thr	Gln	Gln	900	905	910	

Ser Val Glu Val Glu Ser Glu Thr Thr Gln
 915 920

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 <211> 848
 <212> PRT
 <213> Arabidopsis thaliana

<400> 56
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 Ser Phe Ser Leu Arg Lys Asp Ser Arg Ser Ser Gly Lys Val Phe Ala
 35 40 45
 Arg Lys Pro Ser Tyr Asp Ser Asp Ser Ser Ser Leu Ala Thr Thr Ala
 50 55 60
 Ser Glu Lys Leu Arg Gly His Gln Ser Asp Ser Ser Ser Ala Ser
 65 70 75 80
 Asp Gln Val Gln Ser Arg Asp Thr Val Ser Asp Asp Thr Gln Val Leu
 85 90 95
 Gly Asn Val Asp Val Gln Lys Thr Glu Glu Ala Gln Glu Thr Glu Thr
 100 105 110
 Leu Asp Gln Thr Ser Ala Leu Ser Thr Ser Gly Ser Ile Ser Tyr Lys
 115 120 125
 Glu Asp Phe Ala Lys Met Ser His Ser Val Asp Gln Glu Val Gly Gln
 130 135 140
 Arg Lys Ile Pro Pro Pro Gly Asp Gly Lys Arg Ile Tyr Asp Ile Asp
 145 150 155 160
 Pro Met Leu Asn Ser His Arg Asn His Leu Asp Tyr Arg Tyr Gly Gln
 165 170 175
 Tyr Arg Lys Leu Arg Glu Glu Ile Asp Lys Asn Glu Gly Gly Leu Glu
 180 185 190
 Ala Phe Ser Arg Gly Tyr Glu Ile Phe Gly Phe Thr Arg Ser Ala Thr
 195 200 205
 Gly Ile Thr Tyr Arg Glu Trp Ala Pro Gly Ala Lys Ala Ala Ser Leu
 210 215 220
 Ile Gly Asp Phe Asn Asn Trp Asn Ala Lys Ser Asp Val Met Ala Arg
 225 230 235 240

Asn	Asp	Phe	Gly	Val	Trp	Glu	Ile	Phe	Leu	Pro	Asn	Asn	Ala	Asp	Gly	
				245					250					255		
Ser	Pro	Ala	Ile	Pro	His	Gly	Ser	Arg	Val	Lys	Ile	Arg	Met	Asp	Thr	
			260					265					270			
Pro	Ser	Gly	Ile	Lys	Asp	Ser	Ile	Pro	Ala	Trp	Ile	Lys	Tyr	Ser	Val	
		275					280					285				
Gln	Pro	Pro	Gly	Glu	Ile	Pro	Tyr	Asn	Gly	Val	Tyr	Tyr	Asp	Pro	Pro	
	290						295				300					
Glu	Glu	Asp	Lys	Tyr	Ala	Phe	Lys	His	Pro	Arg	Pro	Lys	Lys	Pro	Thr	
305					310					315					320	
Ser	Leu	Arg	Ile	Tyr	Glu	Ser	His	Val	Gly	Met	Ser	Ser	Thr	Glu	Pro	
			325						330					335		
Lys	Ile	Asn	Thr	Tyr	Ala	Asn	Phe	Arg	Asp	Asp	Val	Leu	Pro	Arg	Ile	
		340						345					350			
Lys	Lys	Leu	Gly	Tyr	Asn	Ala	Val	Gln	Ile	Met	Ala	Ile	Gln	Glu	His	
		355					360					365				
Ala	Tyr	Tyr	Ala	Ser	Phe	Gly	Tyr	His	Val	Thr	Asn	Phe	Phe	Ala	Pro	
	370					375					380					
Ser	Ser	Arg	Phe	Gly	Thr	Pro	Asp	Asp	Leu	Lys	Ser	Leu	Ile	Asp	Lys	
385					390					395					400	
Ala	His	Glu	Leu	Gly	Leu	Val	Val	Leu	Met	Asp	Ile	Val	His	Ser	His	
			405						410					415		
Ala	Ser	Lys	Asn	Thr	Leu	Asp	Gly	Leu	Asp	Met	Phe	Asp	Gly	Thr	Asp	
		420						425					430			
Gly	Tyr	Phe	His	Ser	Gly	Ser	Arg	Gly	Tyr	His	Trp	Met	Trp	Asp	Thr	
		435					440					445				
Arg	Leu	Phe	Asn	Tyr	Gly	Ser	Trp	Glu	Val	Leu	Arg	Tyr	Leu	Leu	Ser	
	450					455					460					
Asn	Ala	Arg	Trp	Ala	Leu	Glu	Glu	Tyr	Lys	Phe	Asp	Gly	Phe	Arg	Phe	
465					470					475					480	
Asp	Gly	Val	Thr	Ser	Met	Met	Tyr	Thr	His	His	Gly	Leu	Gln	Val	Glu	
				485					490					495		
Phe	Thr	Gly	Asn	Tyr	Asn	Glu	Tyr	Phe	Gly	Ala	Ser	Thr	Asp	Val	Asp	
		500						505					510			
Ala	Val	Val	Tyr	Leu	Met	Leu	Val	Asn	Asp	Leu	Ile	His	Gly	Leu	Tyr	
	515						520					525				
Pro	Glu	Ala	Ile	Val	Val	Gly	Glu	Asp	Val	Ser	Gly	Met	Pro	Ala	Phe	
	530					535					540					

Cys Val Pro Val Arg Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His
 545 550 555 560
 Met Ala Val Ala Asp Lys Trp Ile Glu Leu Lys Lys Arg Asp Glu
 565 570 575
 Asp Trp Gln Val Gly Asp Ile Thr Phe Thr Leu Thr Asn Arg Arg Trp
 580 585 590
 Gly Glu Lys Cys Val Val Tyr Ala Glu Ser His Asp Gln Ala Leu Val
 595 600 605
 Gly Asp Lys Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp
 610 615 620
 Phe Met Ala Val Asp Arg Gln Ala Thr Pro Arg Val Asp Arg Gly Ile
 625 630 635 640
 Ala Leu His Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu
 645 650 655
 Gly Tyr Leu Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile
 660 665 670
 Asp Phe Pro Arg Thr Asp Gln His Leu Pro Asp Gly Arg Val Ile Ala
 675 680 685
 Gly Asn Asn Gly Ser Tyr Asp Lys Ser Arg Arg Arg Phe Asp Leu Gly
 690 695 700
 Asp Ala Glu Tyr Leu Arg Tyr His Gly Leu Gln Glu Phe Asp Arg Ala
 705 710 715 720
 Met Gln Asn Leu Glu Glu Thr Tyr Gly Phe Met Thr Ser Glu His Gln
 725 730 735
 Tyr Ile Ser Pro Lys Asp Glu Gly Asp Arg Val Ile Val Phe Glu Arg
 740 745 750
 Gly Asn Leu Leu Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser
 755 760 765
 Asp Tyr Arg Ile Gly Cys Ser Val Pro Gly Lys Tyr Lys Ile Val Leu
 770 775 780
 Asp Ser Asp Asn Ser Leu Phe Gly Gly Phe Asn Arg Leu Asp Asp Ser
 785 790 795 800
 Ala Glu Phe Phe Thr Ser Asp Gly Arg His Asp Asp Arg Pro Cys Ser
 805 810 815
 Phe Glu Val Tyr Ala Pro Cys Arg Thr Ala Val Val Tyr Ala Ala Val
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 Asp Glu Arg Ser Ser Leu Val Pro Ile Gly Leu Leu Pro Glu Asp Val
 835 840 845

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 <212> PRT
 <213> Arabidopsis thaliana

<400> 57

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Thr	Gly	Phe	Asn	Ala	Gly	Asn	Ser	Thr	Leu	Ser	Phe	Phe	Phe	Lys	Lys
			20					25					30		
His	Pro	Leu	Ser	Arg	Lys	Ile	Phe	Ala	Gly	Lys	Gln	Ser	Ala	Glu	Phe
		35					40					45			
Asp	Ser	Ser	Ser	Gln	Ala	Ile	Ser	Ala	Ser	Glu	Lys	Val	Leu	Val	Pro
	50					55					60				
Asp	Asn	Leu	Asp	Asp	Asp	Pro	Arg	Gly	Phe	Ser	Gln	Ile	Phe	Asp	Leu
65					70					75					80
Glu	Ser	Gln	Thr	Met	Glu	Tyr	Thr	Glu	Ala	Val	Arg	Thr	Glu	Asp	Gln
				85					90					95	
Thr	Met	Asn	Val	Val	Lys	Glu	Arg	Gly	Val	Lys	Pro	Arg	Ile	Val	Pro
		100						105					110		
Pro	Pro	Gly	Asp	Gly	Lys	Lys	Ile	Tyr	Glu	Ile	Asp	Pro	Met	Leu	Arg
		115					120					125			
Thr	Tyr	Asn	Asn	His	Leu	Asp	Tyr	Arg	Tyr	Gly	Gln	Tyr	Lys	Arg	Leu
	130					135					140				
Arg	Glu	Glu	Ile	Asp	Lys	Tyr	Glu	Gly	Gly	Leu	Glu	Ala	Phe	Ser	Arg
145					150					155					160
Gly	Tyr	Glu	Lys	Leu	Gly	Phe	Ser	Arg	Ser	Asp	Ala	Gly	Ile	Thr	Tyr
			165						170					175	
Arg	Glu	Trp	Ala	Pro	Gly	Ala	Lys	Ala	Ala	Ser	Leu	Ile	Gly	Asp	Phe
			180					185					190		
Asn	Asn	Trp	Asn	Ser	Asn	Ala	Asp	Ile	Met	Thr	Arg	Asn	Glu	Phe	Gly
		195					200					205			
Val	Trp	Glu	Ile	Phe	Leu	Pro	Asn	Asn	Thr	Asp	Gly	Ser	Pro	Ala	Ile
	210					215					220				
Pro	His	Gly	Ser	Arg	Val	Lys	Ile	Arg	Met	Asp	Thr	Pro	Ser	Gly	Ile
225					230					235					240
Lys	Asp	Ser	Ile	Pro	Ala	Trp	Ile	Lys	Phe	Ser	Val	Gln	Ala	Pro	Gly
			245						250					255	
Glu	Ile	Pro	Phe	Asn	Gly	Ile	Tyr	Tyr	Asp	Pro	Pro	Glu	Glu	Glu	Lys

260					265					270					
Tyr	Val	Phe	Lys	His	Pro	Gln	Pro	Lys	Arg	Pro	Lys	Ser	Leu	Arg	Ile
	275						280					285			
Tyr	Glu	Ala	His	Val	Gly	Met	Ser	Ser	Thr	Glu	Pro	Met	Val	Asn	Thr
	290					295					300				
Tyr	Ala	Asn	Phe	Arg	Asp	Asp	Val	Leu	Pro	Arg	Ile	Lys	Lys	Leu	Gly
305					310					315					320
Tyr	Asn	Ala	Val	Gln	Ile	Met	Ala	Ile	Gln	Glu	His	Ser	Tyr	Tyr	Ala
				325					330					335	
Ser	Phe	Gly	Tyr	His	Val	Thr	Asn	Phe	Phe	Ala	Pro	Ser	Ser	Arg	Cys
			340					345					350		
Gly	Thr	Pro	Glu	Glu	Leu	Lys	Ser	Leu	Ile	Asp	Arg	Ala	His	Glu	Leu
		355					360					365			
Gly	Leu	Val	Val	Leu	Met	Asp	Ile	Val	His	Ser	His	Ala	Ser	Lys	Asn
	370					375					380				
Thr	Leu	Asp	Gly	Leu	Asn	Met	Phe	Asp	Gly	Thr	Asp	Ala	His	Tyr	Phe
385					390					395					400
His	Ser	Gly	Pro	Arg	Gly	Tyr	His	Trp	Met	Trp	Asp	Ser	Arg	Leu	Phe
			405					410						415	
Asn	Tyr	Gly	Ser	Trp	Glu	Val	Leu	Arg	Tyr	Leu	Leu	Ser	Asn	Ala	Arg
			420					425					430		
Trp	Ala	Leu	Glu	Glu	Tyr	Lys	Phe	Asp	Gly	Phe	Arg	Phe	Asp	Gly	Val
	435					440						445			
Thr	Ser	Met	Met	Tyr	Thr	His	His	Gly	Leu	Ser	Val	Gly	Phe	Thr	Gly
	450					455					460				
Asn	Tyr	Thr	Glu	Tyr	Phe	Gly	Leu	Glu	Thr	Asp	Val	Asp	Ala	Val	Asn
465					470					475					480
Tyr	Leu	Met	Leu	Val	Asn	Asp	Met	Ile	His	Gly	Leu	Tyr	Pro	Glu	Ala
				485				490					495		
Ile	Thr	Val	Gly	Glu	Asp	Val	Ser	Gly	Met	Pro	Thr	Phe	Cys	Asp	Pro
		500						505					510		
Val	Gln	Asp	Gly	Gly	Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	Ala	Ile
	515						520					525			
Ala	Asp	Lys	Trp	Ile	Glu	Met	Leu	Lys	Lys	Arg	Asp	Glu	Asp	Trp	Gln
	530					535					540				
Met	Gly	Asp	Ile	Ile	Tyr	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Ser	Glu	Lys
545					550					555					560

Cys Ile Ser Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys
 565 570 575
 Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala
 580 585 590
 Val Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His
 595 600 605
 Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
 610 615 620
 Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
 625 630 635 640
 Arg Gly Glu Gln Arg Leu Ser Asp Gly Ser Val Ile Pro Gly Asn Asn
 645 650 655
 Phe Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp
 660 665 670
 Tyr Leu Arg Tyr Arg Gly Leu Gln Glu Phe Asp Gln Ala Met Gln His
 675 680 685
 Leu Glu Glu Asn Tyr Gly Phe Met Thr Ser Glu His Gln Phe Ile Ser
 690 695 700
 Arg Lys Asp Glu Ala Asp Arg Val Ile Val Phe Glu Arg Gly Asp Leu
 705 710 715 720
 Val Phe Val Phe Asn Phe His Trp Thr Ser Ser Tyr Phe Asp Tyr Arg
 725 730 735
 Ile Gly Cys Ser Lys Pro Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
 740 745 750
 Asp Pro Leu Phe Gly Gly Phe Ser Arg Ile Asp Arg Ala Ala Glu Tyr
 755 760 765
 Phe Thr Tyr Asp Gly Leu Tyr Asp Glu Arg Pro Cys Ser Phe Met Val
 770 775 780
 Tyr Ala Pro Cys Arg Thr Ala Val Val Tyr Ala Leu Ala Asn His Asp
 785 790 795 800

<210> 58

<211> 802

<212> PRT

<213> Zea mays

<400> 58

Met Ala Phe Ala Val Ser Gly Ala Val Leu Gly Gly Ala Val Arg Ala
 1 5 10 15

Pro Arg Leu Thr Gly Gly Gly Glu Gly Ser Leu Val Phe Arg His Thr

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Gly	Leu	Phe	Leu	Thr	Arg	Gly	Ala	Arg	Val	Gly	Cys	Ser	Cys	Thr	His		
35						40						45					
Gly	Ala	Met	Arg	Ala	Ala	Ala	Ala	Ala	Arg	Lys	Ala	Val	Met	Val	Pro		
50						55				60							
Glu	Gly	Glu	Asn	Asp	Gly	Leu	Ala	Ser	Arg	Ala	Asp	Ser	Ala	Gln	Phe		
65				70						75				80			
Gln	Ser	Asp	Glu	Leu	Glu	Val	Pro	Asp	Ile	Ser	Glu	Glu	Thr	Thr	Cys		
				85				90						95			
Gly	Ala	Gly	Val	Ala	Asp	Ala	Gln	Ala	Leu	Asn	Arg	Val	Arg	Val	Val		
			100				105						110				
Pro	Pro	Pro	Ser	Asp	Gly	Gln	Lys	Ile	Phe	Gln	Ile	Asp	Pro	Met	Leu		
115						120						125					
Gln	Gly	Tyr	Lys	Tyr	His	Leu	Glu	Tyr	Arg	Tyr	Ser	Leu	Tyr	Arg	Arg		
130						135				140							
Ile	Arg	Ser	Asp	Ile	Asp	Glu	His	Glu	Gly	Gly	Leu	Glu	Ala	Phe	Ser		
145				150						155				160			
Arg	Ser	Tyr	Glu	Lys	Phe	Gly	Phe	Asn	Arg	Ser	Ala	Glu	Gly	Ile	Thr		
				165				170						175			
Tyr	Arg	Glu	Trp	Ala	Pro	Gly	Ala	Phe	Ser	Ala	Ala	Leu	Val	Gly	Asp		
			180				185						190				
Phe	Asn	Asn	Trp	Asp	Pro	Asn	Ala	Asp	Arg	Met	Ser	Lys	Asn	Glu	Phe		
195						200						205					
Gly	Val	Trp	Glu	Ile	Phe	Leu	Pro	Asn	Asn	Ala	Asp	Gly	Thr	Ser	Pro		
210						215				220							
Ile	Pro	His	Gly	Ser	Arg	Val	Lys	Val	Arg	Met	Asp	Thr	Pro	Ser	Gly		
225				230						235				240			
Ile	Lys	Asp	Ser	Ile	Pro	Ala	Trp	Ile	Lys	Tyr	Ser	Val	Gln	Ala	Pro		
				245				250						255			
Gly	Glu	Ile	Pro	Tyr	Asp	Gly	Ile	Tyr	Tyr	Asp	Pro	Pro	Glu	Glu	Val		
			260				265						270				
Lys	Tyr	Val	Phe	Arg	His	Ala	Gln	Pro	Lys	Arg	Pro	Lys	Ser	Leu	Arg		
275						280						285					
Ile	Tyr	Glu	Thr	His	Val	Gly	Met	Ser	Ser	Pro	Glu	Pro	Lys	Ile	Asn		
290						295				300							
Thr	Tyr	Val	Asn	Phe	Arg	Asp	Glu	Val	Leu	Pro	Arg	Ile	Lys	Lys	Leu		
305				310						315				320			
Gly	Tyr	Asn	Ala	Val	Gln	Ile	Met	Ala	Ile	Gln	Glu	His	Ser	Tyr	Tyr		

Leu Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe
 625 630 635 640
 Pro Arg Gly Pro Gln Arg Leu Pro Ser Gly Lys Phe Ile Pro Gly Asn
 645 650 655
 Asn Asn Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala
 660 665 670
 Asp Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln
 675 680 685
 His Leu Glu Gln Lys Tyr Glu Phe Met Thr Ser Asp His Gln Tyr Ile
 690 695 700
 Ser Arg Lys His Glu Glu Asp Lys Val Ile Val Phe Glu Lys Glu Asp
 705 710 715 720
 Leu Val Phe Val Phe Asn Phe His Cys Asn Asn Ser Tyr Phe Asp Tyr
 725 730 735
 Arg Ile Gly Cys Arg Lys Pro Gly Val Tyr Lys Val Val Leu Asp Ser
 740 745 750
 Asp Ala Gly Leu Phe Gly Gly Phe Ser Arg Ile His His Ala Ala Glu
 755 760 765
 His Phe Thr Ala Asp Cys Ser His Asp Asn Arg Pro Tyr Ser Phe Ser
 770 775 780
 Val Tyr Thr Pro Ser Arg Thr Cys Val Val Tyr Ala Pro Val Glu Pro
 785 790 795 800

Val Glu

<210> 59
 <211> 828
 <212> PRT
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<400> 59
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 Ala Gly Ala Val Arg Phe Pro Val Pro Ala Gly Ala Arg Ser Trp Arg
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 Ala Ala Ala Glu Leu Pro Thr Ser Arg Ser Leu Leu Ser Gly Arg Arg
 35 40 45
 Phe Pro Gly Ala Val Arg Val Gly Gly Ser Gly Gly Arg Val Ala Val
 50 55 60
 Arg Ala Ala Gly Ala Ser Gly Glu Val Met Ile Pro Glu Gly Glu Ser
 65 70 75 80

Asp	Gly	Met	Pro	Val	Ser	Ala	Gly	Ser	Asp	Asp	Leu	Gln	Leu	Pro	Ala		
				85					90					95			
Leu	Asp	Asp	Glu	Leu	Ser	Thr	Glu	Val	Gly	Ala	Glu	Val	Glu	Ile	Glu		
			100					105					110				
Ser	Ser	Gly	Ala	Ser	Asp	Val	Glu	Gly	Val	Lys	Arg	Val	Val	Glu	Glu		
		115					120					125					
Leu	Ala	Ala	Glu	Gln	Lys	Pro	Arg	Val	Val	Pro	Pro	Thr	Gly	Asp	Gly		
	130					135					140						
Gln	Lys	Ile	Phe	Gln	Met	Asp	Ser	Met	Leu	Asn	Gly	Tyr	Lys	Tyr	His		
145					150					155					160		
Leu	Glu	Tyr	Arg	Tyr	Ser	Leu	Tyr	Arg	Arg	Leu	Arg	Ser	Asp	Ile	Asp		
				165					170					175			
Gln	Tyr	Glu	Gly	Gly	Leu	Glu	Thr	Phe	Ser	Arg	Gly	Tyr	Glu	Lys	Phe		
			180					185					190				
Gly	Phe	Asn	His	Ser	Ala	Glu	Gly	Val	Thr	Tyr	Arg	Glu	Trp	Ala	Pro		
		195					200					205					
Gly	Ala	His	Ser	Ala	Ala	Leu	Val	Gly	Asp	Phe	Asn	Asn	Trp	Asn	Pro		
	210					215					220						
Asn	Ala	Asp	Arg	Met	Ser	Lys	Asn	Glu	Phe	Gly	Val	Trp	Glu	Phe	Ile		
225					230					235					240		
Leu	Pro	Asn	Asn	Ala	Asp	Gly	Ser	Ser	Pro	Ile	Pro	His	Gly	Ser	Arg		
				245					250					255			
Val	Lys	Val	Arg	Met	Glu	Thr	Pro	Ser	Gly	Ile	Lys	Asp	Ser	Ile	Pro		
			260					265					270				
Ala	Trp	Ile	Lys	Tyr	Ser	Val	Gln	Ala	Ala	Gly	Glu	Ile	Pro	Tyr	Asn		
		275					280					285					
Gly	Ile	Tyr	Tyr	Asp	Pro	Pro	Glu	Glu	Glu	Lys	Tyr	Ile	Phe	Lys	His		
	290					295					300						
Pro	Gln	Pro	Lys	Arg	Arg	Lys	Ser	Leu	Arg	Ile	Tyr	Glu	Thr	His	Val		
305					310					315					320		
Gly	Met	Ser	Ser	Thr	Glu	Pro	Lys	Ile	Asn	Thr	Tyr	Ala	Asn	Phe	Arg		
				325					330					335			
Asp	Glu	Val	Leu	Pro	Arg	Ile	Lys	Lys	Leu	Gly	Tyr	Asn	Ala	Val	Gln		
			340					345					350				
Ile	Met	Ala	Ile	Gln	Glu	His	Ala	Tyr	Tyr	Gly	Ser	Phe	Gly	Tyr	His		
		355					360					365					
Val	Thr	Asn	Phe	Phe	Ala	Pro	Ser	Ser	Arg	Phe	Gly	Thr	Pro	Glu	Asp		

370					375					380					
Leu	Lys	Ser	Leu	Ile	Asp	Lys	Ala	His	His	Leu	Gly	Leu	Val	Val	Leu
385					390					395					400
Met	Asp	Val	Val	His	Ser	His	Ala	Ser	Asn	Asn	Thr	Leu	Asp	Gly	Leu
				405					410					415	
Asn	Gly	Phe	Asp	Gly	Thr	Asp	Thr	His	Tyr	Phe	His	Ser	Gly	Ser	Arg
			420					425					430		
Gly	His	His	Trp	Met	Trp	Asp	Ser	Arg	Leu	Phe	Asn	Tyr	Gly	Asn	Trp
			435				440						445		
Glu	Val	Leu	Arg	Phe	Leu	Leu	Ser	Asn	Ala	Arg	Trp	Ala	Leu	Glu	Glu
	450					455					460				
Tyr	Lys	Phe	Asp	Gly	Phe	Arg	Phe	Asp	Gly	Val	Thr	Ser	Met	Met	Tyr
465				470					475						480
Thr	His	His	Gly	Leu	Gln	Val	Ala	Phe	Thr	Gly	Asn	Tyr	Ser	Glu	Tyr
			485						490					495	
Phe	Gly	Phe	Ala	Thr	Asp	Ala	Asp	Ala	Val	Val	Tyr	Leu	Met	Leu	Val
			500					505					510		
Asn	Asp	Leu	Ile	His	Gly	Leu	Tyr	Pro	Glu	Ala	Ile	Thr	Ile	Gly	Glu
		515					520					525			
Asp	Val	Ser	Ser	Met	Pro	Thr	Phe	Ala	Leu	Pro	Val	Gln	Asp	Gly	Gly
	530					535					540				
Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	Ala	Val	Pro	Asp	Lys	Trp	Ile
545				550					555					560	
Glu	Leu	Leu	Lys	Gln	Ser	Asp	Glu	Ser	Trp	Lys	Met	Gly	Asp	Ile	Val
			565					570					575		
His	Thr	Leu	Thr	Asn	Arg	Arg	Trp	Ser	Glu	Lys	Cys	Val	Thr	Tyr	Ala
		580						585					590		
Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys	Thr	Ile	Ala	Phe	Trp
	595					600						605			
Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala	Leu	Asp	Arg	Pro	Ala
	610					615					620				
Thr	Pro	Ser	Ile	Asp	Arg	Gly	Ile	Ala	Leu	His	Lys	Met	Ile	Arg	Leu
625				630					635					640	
Ile	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	Tyr	Leu	Asn	Phe	Met	Gly	Asn
			645					650					655		
Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	Phe	Pro	Arg	Ala	Pro	Gln	Val
			660					665					670		

Leu Pro Asn Gly Lys Phe Ile Pro Gly Asn Asn Asn Ser Tyr Asp Lys
675 680 685

Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp Tyr Leu Arg Tyr Arg
690 695 700

Gly Met Leu Glu Phe Asp Arg Ala Met Gln Ser Leu Glu Glu Lys Tyr
705 710 715 720

Gly Phe Met Thr Ser Asp His Gln Tyr Ile Ser Arg Lys His Glu Glu
725 730 735

Asp Lys Met Ile Ile Phe Glu Lys Gly Asp Leu Val Phe Val Phe Asn
740 745 750

Phe His Trp Ser Asn Ser Tyr Phe Asp Tyr Arg Val Gly Cys Leu Lys
755 760 765

Pro Gly Lys Tyr Lys Val Val Leu Asp Ser Asp Ala Gly Leu Phe Gly
770 775 780

Gly Phe Gly Arg Ile His His Thr Ala Glu His Phe Thr Ala Asp Cys
785 790 795 800

Ser His Asp Asn Arg Pro Tyr Ser Phe Ser Val Tyr Ser Pro Ser Arg
805 810 815

Thr Cys Val Val Tyr Ala Pro Ala Glu Pro Ala Glu
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<400> 60
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Arg Lys Ser Gln Ser Thr Gly Phe His Gly Asp Arg Arg Thr Ser Ser
20 25 30

Cys Leu Ser Phe Asn Phe Lys Lys Ala Ala Phe Ser Arg Arg Val Phe
35 40 45

Ser Gly Lys Ser Ser His Glu Ser Asp Ser Ser Asn Val Met Val Thr
50 55 60

Ala Ser Lys Arg Val Leu Pro Asp Gly Arg Ile Glu Cys Tyr Ser Ser
65 70 75 80

Ser Thr Asp Gln Leu Glu Ala Pro Gly Thr Val Ser Glu Glu Ser Gln
85 90 95

Val Leu Thr Asp Val Glu Ser Leu Ile Met Asp Asp Lys Ile Val Glu

100					105					110						
Asp	Glu	Val	Asn	Lys	Glu	Ser	Val	Pro	Met	Arg	Glu	Thr	Val	Ser	Ile	
115					120					125						
Gly	Lys	Ile	Gly	Ser	Lys	Pro	Arg	Ser	Ile	Pro	Pro	Pro	Gly	Arg	Gly	
130					135					140						
Gln	Arg	Ile	Tyr	Asp	Ile	Asp	Pro	Ser	Leu	Thr	Gly	Phe	Arg	Gln	His	
145					150					155					160	
Leu	Asp	Tyr	Arg	Tyr	Ser	Gln	Tyr	Lys	Arg	Leu	Arg	Glu	Glu	Ile	Asp	
165					170					175						
Lys	Tyr	Glu	Gly	Ser	Leu	Asp	Ala	Phe	Ser	Arg	Gly	Tyr	Glu	Lys	Phe	
180					185					190						
Gly	Phe	Ser	Arg	Ser	Glu	Thr	Gly	Ile	Thr	Tyr	Arg	Glu	Trp	Ala	Pro	
195					200					205						
Gly	Ala	Thr	Trp	Ala	Ala	Leu	Ile	Gly	Asp	Phe	Asn	Asn	Trp	Asn	Pro	
210					215					220						
Asn	Ala	Asp	Val	Met	Thr	Gln	Asn	Glu	Cys	Gly	Val	Trp	Glu	Ile	Phe	
225					230					235					240	
Leu	Pro	Asn	Asn	Ala	Asp	Gly	Ser	Pro	Pro	Ile	Pro	His	Gly	Ser	Arg	
245					250					255						
Val	Lys	Ile	Arg	Met	Asp	Thr	Pro	Ser	Gly	Asn	Lys	Asp	Ser	Ile	Pro	
260					265					270						
Ala	Trp	Ile	Lys	Phe	Ser	Val	Gln	Ala	Pro	Gly	Glu	Leu	Pro	Tyr	Asn	
275					280					285						
Gly	Ile	Tyr	Tyr	Asp	Pro	Pro	Glu	Glu	Glu	Lys	Tyr	Val	Phe	Lys	Asn	
290					295					300						
Pro	Gln	Pro	Lys	Arg	Pro	Lys	Ser	Leu	Arg	Ile	Tyr	Glu	Ser	His	Val	
305					310					315					320	
Gly	Met	Ser	Ser	Thr	Glu	Pro	Val	Ile	Asn	Thr	Tyr	Ala	Asn	Phe	Arg	
325					330					335						
Asp	Asp	Val	Leu	Pro	Arg	Ile	Lys	Lys	Leu	Gly	Tyr	Asn	Ala	Val	Gln	
340					345					350						
Leu	Met	Ala	Ile	Gln	Glu	His	Ser	Tyr	Tyr	Ala	Ser	Phe	Gly	Tyr	His	
355					360					365						
Val	Thr	Asn	Phe	Tyr	Ala	Ala	Ser	Ser	Arg	Phe	Gly	Thr	Pro	Asp	Asp	
370					375					380						
Leu	Lys	Ser	Leu	Val	Asp	Lys	Ala	His	Glu	Leu	Gly	Leu	Leu	Val	Leu	
385					390					395					400	
Met	Asp	Ile	Val	His	Ser	His	Ala	Ser	Thr	Asn	Thr	Leu	Asp	Gly	Leu	

405										410					415				
Asn	Met	Phe	Asp	Gly	Thr	Asp	Gly	His	Tyr	Phe	His	Ser	Gly	Pro	Arg				
			420					425					430						
Gly	His	His	Trp	Met	Trp	Asp	Ser	Arg	Leu	Phe	Asn	Tyr	Gly	Ser	Trp				
		435					440					445							
Glu	Val	Leu	Arg	Phe	Leu	Leu	Ser	Asn	Thr	Arg	Trp	Trp	Leu	Asp	Glu				
	450					455					460								
Tyr	Lys	Phe	Asp	Gly	Phe	Arg	Phe	Asp	Gly	Val	Thr	Ser	Met	Met	Tyr				
465					470					475					480				
Thr	His	His	Gly	Leu	Gln	Val	Asp	Phe	Thr	Gly	Asn	Tyr	Asn	Glu	Tyr				
			485						490					495					
Phe	Gly	Tyr	Ala	Thr	Asp	Val	Asp	Ala	Val	Val	Tyr	Leu	Met	Leu	Leu				
			500					505					510						
Asn	Asp	Met	Ile	His	Gly	Leu	Phe	Pro	Glu	Ala	Val	Thr	Ile	Gly	Glu				
		515					520					525							
Asp	Val	Ser	Gly	Met	Pro	Thr	Val	Cys	Ile	Pro	Val	Glu	Asp	Gly	Gly				
	530					535					540								
Val	Gly	Phe	Asp	Tyr	Arg	Leu	His	Met	Ala	Val	Ala	Asp	Lys	Trp	Val				
545					550					555					560				
Glu	Ile	Ile	Gln	Lys	Arg	Asp	Glu	Asp	Trp	Lys	Met	Gly	Asp	Ile	Val				
			565						570					575					
His	Met	Leu	Thr	Asn	Arg	Arg	Trp	Leu	Glu	Lys	Cys	Val	Ser	Tyr	Ala				
		580						585					590						
Glu	Ser	His	Asp	Gln	Ala	Leu	Val	Gly	Asp	Lys	Thr	Ile	Ala	Phe	Trp				
		595					600					605							
Leu	Met	Asp	Lys	Asp	Met	Tyr	Asp	Phe	Met	Ala	Arg	Asp	Arg	Pro	Ser				
	610					615					620								
Thr	Pro	Leu	Ile	Asp	Arg	Gly	Ile	Ala	Leu	His	Lys	Met	Ile	Arg	Leu				
625					630						635				640				
Ile	Thr	Met	Gly	Leu	Gly	Gly	Glu	Gly	Tyr	Leu	Asn	Phe	Met	Gly	Asn				
			645						650					655					
Glu	Phe	Gly	His	Pro	Glu	Trp	Ile	Asp	Phe	Pro	Arg	Gly	Asp	Arg	His				
			660					665					670						
Leu	Pro	Asn	Gly	Lys	Val	Ile	Pro	Gly	Asn	Asn	His	Ser	Tyr	Asp	Lys				
		675					680					685							
Cys	Arg	Arg	Arg	Phe	Asp	Leu	Gly	Asp	Ala	Asp	Tyr	Leu	Arg	Tyr	His				
	690					695					700								

Gly	Met	Gln	Glu	Phe	Asp	Gln	Ala	Met	Gln	His	Leu	Glu	Glu	Ala	Tyr	
705					710					715					720	
Gly	Phe	Met	Thr	Ser	Glu	His	Gln	Tyr	Ile	Ser	Arg	Lys	Asp	Glu	Gly	
				725					730					735		
Asp	Arg	Ile	Ile	Val	Phe	Glu	Arg	Gly	Asn	Leu	Val	Phe	Val	Phe	Asn	
				740				745					750			
Phe	His	Trp	Thr	Asn	Ser	Tyr	Ser	Asp	Tyr	Arg	Val	Gly	Cys	Phe	Lys	
		755					760					765				
Ser	Gly	Lys	Tyr	Lys	Ile	Val	Leu	Asp	Ser	Asp	Asp	Gly	Leu	Phe	Gly	
	770					775					780					
Gly	Phe	Asn	Arg	Leu	Ser	His	Asp	Ala	Glu	His	Phe	Thr	Phe	Asp	Gly	
785					790					795					800	
Trp	Tyr	Asp	Asn	Arg	Pro	Arg	Ser	Phe	Met	Val	Tyr	Ala	Pro	Ser	Arg	
				805					810					815		
Thr	Ala	Val	Val	His	Ala	Leu	Val	Glu	Asp	Glu	Glu	Asn	Glu	Ala	Glu	
			820					825					830			
Asn	Glu	Val	Glu	Ser	Glu	Val	Lys	Pro	Ala	Ser	Gly					
		835					840									